TROPICAL DISEASES BUREAU.

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HELMINTHIASIS.

KOBAYASHI (H.). **[On the Life-History and Morphology of the Liver Distome** *Clonorchis sinensis*.] [English text.]—*Mitteil. a. d. Mediz. Fachschule z. Keijo.* 1917. pp. 251–284. With 5 plates.
[Abstract from Review by R. G. MILLS.]

The chief facts of the life cycle of *Clonorchis sinensis* have already been communicated by this author [see this *Bulletin*, Vol. 8, p. 183]. The present paper adds considerable detail to previous knowledge, especially in relation to the question of duality of species within this genus as hypothesized by Looss.

Clonorchiasis in Japan is caused by the consumption of raw or partially prepared cyprinoid fishes. To the list previously given is added *Leucogobis mayedae*. *Carassius auratus* is the least heavily infected, but is the most injurious.

It was experimentally ascertained that the encysted larvae are killed at 100° C., but retain their vitality for at least fifteen minutes at lower temperatures. In vinegar and soy-sauce they survive five hours. In the refrigerator the larvae within the fish remain alive for several days. If kept at ordinary temperatures they die as soon as the fish putrifies.

Details are given of the development of the young distome in the final host. The worms attain sexual maturity in 26 days and the eggs are found in the faeces.

The occurrence of spines on the skin has caused confusion in the identification of this form. In the young distomes spines are present. They disappear in the full-grown specimens.

Looss differentiated *Clonorchis sinensis* and *Clonorchis endemicus* on (1) size, (2) discontinuity of vitellaria, (3) interstitial pigmentation, (4) size and shape of egg.

The author shows that size of the adult is related to intensity of infection of the host, and that there is in experimentally reared forms no constancy either in the discontinuity of the vitellaria or the occurrence of interstitial pigment; the larger forms are generally pigmented and have discontinuous vitellaria and this is probably due to age. In the shell quite the reverse in shape is met with in some instances. From these facts the author concludes that in Japan there is only one species and that *Clonorchis sinensis* and *Clonorchis endemicus* are synonymous.

R. T. Leiper.

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QUERENS (Percy Lennard). **La presencia del *Chlonorchis sinensis* en Cuba Oriental.**—*Rev. Med. y Cirug. Habana.* 1917. June 25. Vol. 22. No. 12. pp. 297–304.

The Occurrence of *Clonorchis sinensis* in Eastern Cuba. (Translation.)—*New Orleans Med. & Surg. Jl.* 1917. Dec. Vol. 70. No. 6. pp. 500–506.

History of the case of a Chinaman, aged 31, a native of Canton, who had lived in Cuba for eight years in a condition of otherwise perfect health. For the last four years, however, pain had been felt, with a sensation of weight, in the region of the liver, to which more recently had been added vomiting after meals and abundant diarrhoea. On admission to hospital the patient exhibited much emaciation and loss of flesh. The skin and conjunctiva had a slight icteric tint. The muscular system showed great flaccidity and the pupillary reflex was sluggish. It responded, however, both to light and accommodation. Cremasteric and patellar reflexes were negative, and Babinski's sign positive. A haemic murmur was audible in the heart and great vessels. The area of hepatic dulness was much diminished, while the spleen could not be felt. Ova of *Clonorchis sinensis* were found in the stools. The examination of the blood revealed a high degree of anaemia, and also the presence of malarial parasites. The patient died after a stay of six days in hospital, from a continuance of the vomiting and general weakness, quinine having been given on account of the presence of parasites in the blood. An autopsy could not be obtained, but the author ascribes the death to infection with Clonorchis. This is the first case reported from Cuba. [But actually there is no ground for assuming that the infection was acquired since leaving China.—R.T.L.]

J. B. Nias.

NAKAGAWA (Koan). **Human Pulmonary Distomiasis caused by *Paragonimus westermanni*.**—*Jl. Experim. Med.* 1917. Sept. 1. Vol. 26. No. 3. pp. 297–323. With 10 plates.

Paragonimiasis is extremely prevalent in Northern Formosa; 4·3 per cent. of the pupils of all the public schools in the Prefecture of Shinchiku were found to be suffering from the disease. Among the savage tribes about half of the total population were infected. Attempts at miracidial infection showed that *Melania libertina* and *M. obliquegranosa* have some selective affinity but efforts to keep the molluscs alive failed. As *Melania libertina* was the only species that lives in the thickly infected regions it was assumed that a cercaria with an oval spine found in this snail was the larva of the Paragonimus. These cercariae were also found on one occasion in *Melania tuberculata*. The second intermediate host was ascertained to be the crab. An encysted cercaria bearing a striking resemblance to that found in Melania was observed in three species, viz., *Potamon* (*Geothelphusa*) *obtusipes*, *P. dehaani* and *Eriocheir japonicus*. Of these the first shows the largest percentage of natural infections, the second a much smaller and the last is but rarely infected. *Astacus japonicus* is another intermediary in Korea—and *Sesarma dehaanii* has been implicated in Japan. The encysted cercariae are found in the gills, liver and muscle and have

an elongated dark excretory vesicle in the middle of their bodies. Fully grown encysted cercariae when fed to dogs develop into mature worms in the lungs and begin egg-laying in about ninety days. The encysted cercariae after ingestion are liberated in the intestine and bore through the jejunum into the abdominal cavity. They then pierce the diaphragm, enter the thoracic cavity, and passing the pleura, reach the lungs where they form cysts in the parenchyma and become adults.

Although non-infected crabs were difficult to obtain, experiments were carried out which successfully established on an experimental basis the link between the cercariae found in *Melania* and the encysted forms in the crab. These encysted cercariae vary in size and shape with age. The younger are chiefly found in the liver while the older chiefly occur either in the liver or gills. Full grown forms are contained within a cyst from 0·26 to 1·0 mm. by 0·4 mm. The cyst has a characteristically thick wall. Under natural conditions the cysts seem to detach from the gills and drift in the stream which thereby becomes a source of infection. Newly hatched cercariae do not resist even slight temperature changes. Free living cercariae may be swallowed by man with water or food without harm. Within the cysts on the other hand they are hardy and withstand, for quite a time, immersion in solutions of salt, soya sauce and vinegar. Hence crabs are dangerous unless they have been in soya sauce or vinegar for two hours or more after their carapaces are removed. The eating of raw or imperfectly prepared crabs and the drinking of river water from crab-infested regions are the two principal causes of pulmonary distomiasis.

[The developmental stages throughout the life cycle from miracidium to adult are beautifully illustrated, and the experimental evidence is throughout supported with an admirable wealth of detail.]

R. T. L.

Ando (R.). **[Experimental Treatment of Pulmonary Infection with *Paragonimus westermanii* with Emetine Hydrochloride.]**—*Taiwan Igakukai Zasshi.* (*Jl. Formosa Med. Soc.*) 1917. Mar. 28. No. 173. pp. 200–201.

[Abstract from Review by R. G. Mills.]

The results of experiments on infected dogs encouraged the author to try the effect of the daily injection of emetine on patients. In severe cases 23 injections decreased the excretion of eggs in the sputum but did not entirely stop the disease. Nine injections seemed to check its course in some cases of slight infection. The author was seemingly pleased with the degree of improvement noticed in all.

R. T. L.

Salomon & Neveu (R.). **Hémoptysies parasitaires chez les soldats indigènes d'Extrême-Orient. Le *Paragonimus westermanni*.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1917. Mar. 8. 3 Ser. Vol. 33. No. 7–8. pp. 388–394.

The authors have observed among Annamite and Indochina native troops serving in France cases of haemoptysis due not to tubercle but

to *Paragonimus westermanni.* They express the fear [which need not arise on the known life cycle of the parasite] that the infection may be spread in Europe. Clinical notes are given of four cases. In the first, a native of Hué, Annam, there was no fever; the sputum was nummular, thick and purulent, tinged red with blood. Numerous eggs of Paragonimus were found microscopically. The case had been diagnosed as chronic bronchitis. The other three cases showed generalised bronchitis with haemoptysis but the clinical diagnosis could not be confirmed by microscopical examination of the sputum owing to the war exigencies. The paper concludes with a brief summary of the known facts regarding the distribution and clinical signs of this parasitic affection.

R. T. L.

Muto (M.). **[The First Intermediate Host of *Metagonimus yokogawai.*]** —*Kyoto Igaku Zasshi.* (*Kyoto Jl. Med. Sci.*). 1917. Jan. Vol. 14. No. 1. pp. 115–134.

[Based on Review by R. G. Mills.]

The author has found *M. yokogawai* in persons from Kaishu, Korea. In this district various snails were examined and *Melania libertina* was found infected in from 2 per cent. to 50 per cent. with a redia and cercarial form. The cercaria has a long simple tail, oral and ventral suckers. The mouth is guarded by 4–6 spines. There are two black eyespots in the second fifth of the body. The tail measures 0·286 mm. and the body 0·2296 mm. The livers of snails infested with this larval stage were broken up and added to water in which uninfected gold fish were kept. Later encysted cercariae were found under the scales and in the tissues at the base of the tail and fins. The muscles were entirely free from cysts. Kittens were then fed with the infected fish and in 12 to 15 days were invariably found infected. The eggs as passed in the faeces are elliptical in shape, light-yellowish in colour and provided with a double wall that has a small projection from the blunt end and a small crescent shaped operculum at the other: they measured 0·033 mm. by 0·021 mm. Sometimes they were obtained only 0·024 mm. by 0·0128 mm. [*Melania libertina* has already been implicated as the primary intermediate host of *Clonorchis sinensis* and *Paragonimus westermanni.*]

R. T. L.

Ferguson (A. R.). **Some Notes on Bilharziasis.**—*Jl. Roy. Army Med. Corps.* 1917. July. Vol. 29. No. 1. pp. 57–65.

These notes usefully summarise the chief facts of importance regarding the history, geographical distribution, structure, etiology and pathology of bilharziasis more particularly as seen in Egypt. It is mentioned that an outbreak of rectal bilharziasis has recently occurred amongst the Australian troops quartered at Tel-el-Kebir.

Although the eggs usually occur in the wall of the bladder and rectum the author's researches lead him to conclude that ova may exist in comparatively small numbers in many other tissues and organs of the body in comparatively small numbers without inducing such pathological changes as would give rise to clinical symptoms.

When however they occur in the spinal cord, as in certain cases of chronic bilharziasis seen from time to time in Egypt, somewhat anomalous groups of symptoms referable to the lower part of the spinal cord make their appearance in the later stages. Sometimes these symptom-groups will imitate locomotor ataxia and sometimes disseminated sclerosis. In such cases completely calcified ova, surrounded by well-marked signs of neuroglial hypertrophy, can be found on microscopical examination. In the female the uterus and ovaries may be invaded by the Bilharzia ova in considerable numbers and in some cases the ovaries may be so altered by a chronic oöphoritis that this form of infection persisting from infancy must undoubtedly be a cause of sterility in young married native women.

The author's observations abundantly confirm the view that whereas the lateral-spined eggs are mainly discharged in the faeces they may occur in the urine, while the terminal-spined eggs largely predominating in the bladder may be fairly evenly mixed with lateral-spined eggs in the faeces.

R. T. L.

Morel (L.) & Maldonado (I.). **Réflexions suggérées par quatre observations de bilharziose vésicale.**—*Jl. d'Urologie.* 1917. Aug. Vol. 7. No. 1. pp. 27–37.

Clinical notes are given of four cases of bilharziasis met with in France. Of these three came from West Africa. The fourth case is however of especial importance as the patient, age 27, was born in Cochin-China, resided in France until 1909, and returned to Cochin-China for eighteen months' service. He then returned to France and was mobilised in 1914. In 1915 coloured urine was passed for the first time. In 1917 he was demobilised for haematuria. Many eggs of *Schistosoma haematobium* were found in the urine. The authors find that the various remedies advised have no permanent influence on the disease. Emetine, recommended by Bouilliez in 1915, was tried without success in one case. Neo-salvarsan appeared to lower the number of eggs eliminated during the exhibition of the drug but had no prolonged effect after treatment was suspended. The parasites were obviously not killed and renewed their activity.

R. T. L.

Potts (J. L.). **A Case of Recurrent Bilharziosis.**—*Jl. Trop. Med. & Hyg.* 1917. May 15. Vol. 20. No. 10. p. 110.

A patient at the age of 14 became infected with *Schistosomum haematobium* in 1912 while living in Northern Transvaal. There was haematuria, pain on micturition and pain in the kidneys, most marked when lying down. The attack lasted three months and the symptoms then completely disappeared.

In November 1916 the patient came from Africa to England and in the following March had a recurrence of symptoms. Terminal spined eggs were found in the urine. This gives an incubation period of five months for the second attack. There is no reason to believe that the first attack had not been completely cured. The patient frequently bathed in the rivers and was then continually exposed to

re-infection. The differential leucocyte count gave polynuclear 47·4 per cent., eosinophile 9·4 per cent., large mononuclear 4·7 per cent., lymphocytes 37·5 per cent., mast cells 0·7 per cent. The considerable fall in the polynuclear cells and the increase in the lymphocytes appears as an unusual feature.

R. T. L.

DIAMANTIS. **Quelques considérations sur le mode d'infestation de l'homme par le** *Schistosomum haematobium*.—*Jl. d'Urologie.* 1917. Aug. Vol. 7. No. 1. pp. 9–16.

The author discusses from the standpoint of the clinician the relative merits of the three hypothesis of infection in bilharziasis, viz., penetration (a) by the mouth, (b) through the skin, (c) by the perineal appendages. He believes that the differences between the extent of infection in males and females is to be explained best on the last hypothesis. The religious ablutions six or seven times daily imposed on the Mussulman are rarely practised by the women. The dorsal vein of the penis probably plays an important part in the direct infection of the bladder wall, and this explains the relative frequency of vesical over rectal lesions.

R. T. L.

LUTZ (Adolpho). **Observações sobre a evolução do** *Schistosomum mansoni*. **(Segunda nota prévia.)** [Observations on the Development of *Schistosomum mansoni*. Second Preliminary Note.]—*Brazil Medico.* 1917. Mar. 10 & 17. Vol. 31. Nos. 10, 11. pp. 81–82; 89–90.

The author continues in this paper his account of the development of the cercariae of *S. mansoni* as observed in *Planorbis olivaceus* [for the first part see this *Bulletin*, Vol. 9, p. 271]. The development proceeds as described by LEIPER, whom the author can confirm in all essential particulars. The cercariae have on their heads a ring of six or more small points, like the crown of a trephine, which may be considered to be a boring organ. This feature is not mentioned by LEIPER, but the Japanese observers have noted it, in *S. japonicum*, without however attributing to it any importance. The buccal sucker, oval in form, appears to have its muscles very little developed, but its base can be protruded like a proboscis, and perhaps helps in the act of perforation. The forked part of the tail forms a separate portion, and is bent at right angles to the body of the cercaria, when it is floating on the surface of the water, so as to form a float, from which the body depends. In swimming the tail vibrates rapidly, and makes the cercaria very visible. Examination of the infected molluscs shows that the cercariae develop in sporocysts, occurring in great numbers in the liver and hermaphrodite gland, and in this way they produce a state of very considerable marasmus which proves fatal to the snail. The longest period over which an infected snail was kept under observation was three months.

To infect laboratory animals with cercariae, the author pours water containing them into the ears of rabbits, and with smaller animals, like guinea-pigs, he applies the liquid to the shaved surface of the

abdomen, by means of a glass tube shaped like a Fergusson's speculum. At the end of from ½ to 1 hour the liquid will be full of detached tails, showing that the cercariae have penetrated the skin, the animal being tied down suitably meanwhile by means of straps of gauze. Some irritation may ensue at the seat of inoculation, which is indicated by the scratching of the animal. The animals generally support the inoculation well. In a rabbit which died from an accident, the mesenteric veins were found full of parasites. Adult worms were observed with sexual organs well developed within 5 or 6 weeks from the time of inoculation.

The distribution of *S. mansoni* in Brazil probably corresponds to that of *Planorbis olivaceus*, a species principally found in the north of Brazil, living in fresh water, especially in stagnant pools with much aquatic vegetation. Bathing in such pools and drinking from them should therefore be rigorously avoided. The States of Bahia, Sergipe and Piauhy possess this mollusc, and possibly also Parahyba and Pernambuco. South of Bahia it has not been hitherto found.*

J. B. N.

Iturbe (Juan). **Distribución y profilaxia de la *Bilharzia mansoni* en Caracas.**—*Gaceta Med. de Caracas.* 1917. Apr. 30. Vol. 24. No. 8. p. 70.

A paper of purely local interest describing the localities immediately round Caracas in which *Planorbis guadelupensis*, the host of *B. mansoni*, is found. It is recommended to run dry all such water courses every three months for 10 to 15 days, in order to destroy the snails, and for small pools of water to add sulphate of ammonia in sufficient quantity. As the female snail carries her eggs within the shell, the ova are destroyed with the parent. Leiper's further recommendations are also quoted, viz., to add a gramme of *alquitrán* [? = cresol] to every 10 litres of water for a bath, and a gramme of bisulphate of soda per litre to all drinking water.

J. B. N.

Zuelzer (Margarete). **Kurzer Beitrag zur Kenntnis der Jugendstadien von *Bilharzia haematobia* (*Schistosomum haematobium.*)** [The Early Stages of *B. h.*]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1917. Sept. Vol. 21. No. 16. pp. 269–275. With 3 text-figs.

This paper deals with observations on the eggs and miracidia obtained from an Egyptian with urinary bilharziasis. It is known that within their egg-shells the miracidia can remain alive in the tissues of the living body for years. When passed in urine they die after several hours. At a temperature of from 4° C. to 10° C. the eggs can be kept without losing their vitality for eighteen weeks in Ringer's solution. The miracidia do not survive when the eggs are exposed to frost. This susceptibility to cold is regarded as of epidemiological importance. At the optimal temperature of 37° C. about 95 per cent. of the eggs hatch within about 15 minutes giving rise to

* [*Planorbis guadelupensis* more recently implicated by Iturbe in Caracas is very similar to, if not identical with, *P. olivaceus*.—R.T.L.]

actively motile miracidia. The miracidia have two transverse rows of stout cirri among the ciliated covering. The anterior row comprises 16 cirri, the posterior 18 to 20 cirri.

Experiments were made to ascertain the effect on the living miracidia of serum from the guinea-pig, from normal man and from a person infected with bilharziasis. In every case the miracidia died within thirty minutes. With serum and with bile from the case of bilharziasis the lethal action was more rapid. On the other hand living eggs injected into the peritoneal cavity of guinea-pigs were found unchanged after eight days and when placed in warm water gave active miracidia.

R. T. L.

Cawston (F. G.). i. **The Cercarial Infection of South African Snails.**—*Med. Jl. S. Africa.* 1917. July. Vol. 12. No. 12. pp. 183–189. With 12 text-figs.

ii. **Snails as Intermediary Hosts.**—*S. African Med. Rec.* 1917. Aug. 11. Vol. 15. No. 15. pp. 234–236.

iii. **Bilharzia in Pools.**—*Ibid.* Oct. 27. No. 20. pp. 313–314.

i. One thousand five hundred specimens of freshwater snails were collected and examined in Natal during 1916. Two hundred and eleven specimens harboured cercariae of various kinds. Not uncommonly more than one form of cercaria was met with in the same snail. In *Planorbis pfeifferi* the *Cercaria catenata* occurred in 30 per cent. during May, June and July at the Toll Gate Brickfields, Durban. In *Physopsis africana* and in two specimens of *Limnaea natalensis* from the Umsindusi leptocercous cercariae were obtained; 99 specimens of *Physopsis africana* harboured furcocercous cercariae. They were of various forms. All were distomes "possessing a divided gut and none showed any indication of a pharynx." Those obtained from Durban were slightly larger than those from the Umsindusi. Specimens of *P. africana* collected from the Umsindusi during the winter months were often infested with furcocercous cercariae which showed no sign of pharynx. Two distinct types occurred often in the same specimen. At Durban brickfields 23 specimens of *P. africana* contained schistosome cercariae. Efforts to infect animals have so far given no positive result although the cercariae are similar to those successfully injected into a guinea-pig by Dr. J. G. Becker. Experimental infection of *P. africana* with miracidia resulted in the find of a small sporocyst containing undefined cercariae throwing out branches throughout the liver substance in one specimen. At the end of a fortnight a similarly young sporocyst occurred in a second specimen which also contained undeveloped furcocercous cercariae. At the end of three weeks 14 out of 31 specimens were found to harbour Bilharzia cercariae whereas another series used as a control gave only 15 per cent. natural infections. In further experiments the infected forms found were 37 per cent. and 27 per cent. as contrasted with 22 per cent. and 23 per cent. No other species was found susceptible. Twenty examples of *Isidora compta* found in the Umsindusi, at Goodwill's Dam, were free from natural infection.

ii. The author gives a brief summary of the various hosts which are now known to transmit trematode infections of man in different

parts of the world, and gives statistics of local infections of snails at Toll Gate, Durban, during 1916, with "tadpole" and bifid tailed cercariae.

iii. In view of the fact that Dr. BECKER has shown experimentally that *Physopsis africana* is the intermediate host of a Bilharzia worm in South Africa it has been suggested that an attempt be made to determine how far the distribution of this snail corresponds with the distribution of bilharziasis. The author has accordingly examined pools reputed to be dangerous at Toll Gate, Durban, at Avoca and recently the source and tributaries of the Crocodile River, a branch of the Limpopo. At Durban Physopsis were found naturally infected. At Avoca non-infected snails were obtained in large numbers. No Physopsis were obtained from the river above the factories at Magaliesburg but a bathing pool along the course of the river gave heavily infected forms. At Mulder's drift none of the species was found but an overflow pool on one of the farms gave large numbers of uninfected Physopsis. At Rustenburg suspected stagnant pools on the Kloof river showed two out of seven Physopsis infected. Several uninfected specimens came from the Hex river. At Scheerpoort the river seemed clear of rushes and gave no shells. In a spruit leading from a dam which was also clear of reeds 1 Ancylus, 3 Limnaea, 1 *Planorbis pfeifferi* and 3 Physopsis were recovered but none showed cercariae. Most of these pools could be filled in or the rushes removed. The use of cyanide or lime might succeed in keeping these agreeable bathing places free from the intermediary host.

R. T. L.

DIAMANTIS. **Sur un nouveau traitement de l'hématurie bilharzienne en Egypte.**—*Jl. d'Urologie.* 1917. Aug. Vol. 7. No. 1. pp. 17–25.

From his results with thirty cases the author claims that in simple, non-septic, bilharzial haematuria emetine given intravenously in doses of ·05–·1 per injection has a specific anthelmintic action.

R. T. L.

STEWART (F. H.). **Note on Ascaris Infection in Man, the Pig, Rat, and Mouse.**—*Indian Med. Gaz.* 1917. Aug. Vol. 52. No. 8. pp. 272–273.

A further series of experiments have shown that ripe eggs of *Ascaris* of the pig hatch in the intestine of that animal and pass through the liver and lungs to the trachea as had been previously ascertained when the animals used for experiment were rats and mice. If the infection is massive acute inflammation of the lungs results from the passage of the larvae. Six pigs were infected and killed after varying periods to study the later developments of the ascarids. In five cases no intestinal worms were found and in the other the infection is not regarded as attributable to the experimental feeding. Considering the large numbers of eggs used the author considers the evidence of these experiments as directly opposed to the theory of direct development without an intermediate host. He maintains that on present evidence the invasion of the lungs with the larvae in the pig and in

man is an accidental circumstance, not part of the normal cycle, and that the rat and mouse are essentially intermediaries, from the faeces of which the pig and man become secondarily infected.

R. T. L.

LANE (Clayton). i. *Ascaris lumbricoides* **and Coprophagia.**—*Indian Med. Gaz.* 1917. Aug. Vol. 52. No. 8. pp. 269–272.

ii. **Major Stewart on Ascaris Infection.** [Correspondence.]—*Ibid.* p. 301.

Reviewing STEWART'S work on the experimental infection of rats and mice with larvae from eggs of *Ascaris lumbricoides*, Lane supports the view advanced in the editorial of the *British Medical Journal* and held by others that the rats and mice act as facultative not as essential hosts and that the experiments prove that the larvae make the vasculo-pulmonary circuit as a necessary preliminary to intestinal infection of the definitive host. Similar experiments made on a guinea-pig with larval *Necator americanus* by the Anaemia Commission are quoted effectively to illustrate this contention.

R. T. L.

STEWART (F. H.); LANE (Clayton). **The Life-History of** *Ascaris lumbricoides.* [Correspondence.]—*Indian Med. Gaz.* 1917. Oct. Vol. 52. No. 10. pp. 379–380.

Major Stewart deals *seriatim* with the criticisms and analogies advanced by Lieut.-Col. Lane in a paper and letter in the August issue of the *Indian Medical Gazette* dealing with Stewart's interpretation of his recent experiments on the life-cycle of *Ascaris lumbricoides.* Stewart had taken the ground that his experimental animals, viz., rats and mice, were not simply facultative hosts but were actually real and essential intermediaries in the normal transmission of *Ascaris lumbri oides.* In his reply Lane admits that the proof of direct infection is markedly weaker than he had supposed but he maintains this view, independently formed from that expressed in a *British Medical Journal* leader, that the experiments and other facts advanced by Major Stewart are satisfactorily explicable only on the supposition that Ascaris larvae make the vasculo-pulmonary circuit in every animal into which penetration is possible, including man, and that the occurrence of this phenomenon in the rat cannot be accepted as evidence that this is an intermediary host for *Ascaris lumbricoides.*

R. T. L.

HALL (Maurice C.). **The Longevity of Adult Ascarids outside the Body of the Host. Its Bearing on Anthelmintic Treatment.**—*Jl. Amer. Med. Assoc.* 1917. Mar. 10. Vol. 68. No. 10. pp. 772–773.

The preliminary fasting and purgation prior to anthelmintic treatment is of course a very desirable procedure but its utility, according to the author, lies in the removal of the bulky food mass which might protect the worm from the action of the drug and not, as has been supposed by some, in forcing a fast upon the worms so that they will greedily absorb the anthelmintic. *Ascaris suum* were kept alive in Kronecker's salt solution (physiological salt solution containing 0·06 gm. per litre) for from fifteen to twenty-six days.

R. T. L.

Balliano (Arturo). **Sopra la presenza di un'ascaride lombricoide nella cavità pleurica destra.** [Presence of an *Ascaris lumbricoides* in the Right Pleural Cavity.]—*Giorn. d. R. Accad. Med. di Torino.* 1917. Jan.-Feb. Vol. 80. No. 1–2. pp. 185–193.

The case was that of a female child, aged two-and-a-half years, who for eight months previously had suffered from violent and incessant cough, night-sweats, loss of flesh, gastro-intestinal disturbances and attacks of fever. The condition had been ascribed to tubercle. More recently the mother had noticed the presence of a swelling of the size of a nut, in the right costal region, which subsided when the child was quiet.

An examination made by the author disclosed the presence of fluid in the right side of the chest; the tumour was found to be an extravasation of the pleural contents under the skin. An incision was made under chloroform into the eighth intercostal space in the axillary line, at the site of the tumour, and a portion of rib was also resected. The operation gave exit to a large quantity of yellowish-white turbid fluid, containing masses of fibrin, and also to a round worm, 10 centimeters in length, which had been lying in the cavity. In the hurry of the operation it was not noticed whether the worm showed signs of life at the time of removal, but it seemed to be in a fresh condition. The patient made a good recovery. There was no sign of communication between the pleural cavity and the bowel, as evidenced by faecal contamination, so that the exact mode of penetration of the worm into the pleural sac remained a matter of doubt.

J. B. N.

Steber. **Zum Verlaufe und zur Behandlung schwerer Spulwurm-Erkrankungen.** [The Course and Treatment of Severe Round-Worm Infection.]—*Deut. Med. Woch.* 1917. Aug. 16. Vol. 43. No. 33. pp. 1040–1041.

In two children the presence of numbers of *Ascaris lumbricoides* was found, at operation, to explain abdominal symptoms. In one case after unsuccessful treatment with calomel and santonin for two days, Oleum chenopodii with castor oil was given. The worms were quickly expelled. In the second case the patient died from cerebral intoxication before the worms could be removed.

R. T. L.

de Mello (Froliano). **Um caso de oclusão intestinal provocada pela ascaridiose.** [A Case of Intestinal Obstruction due to Ascarides.]—*Bol. Ger. Med. e Farmacia.* Nova-Gôa. 1917. Apr. Vol. 4. No. 4. pp. 144–146.

Notes of the case of a policeman, who was admitted to hospital with symptoms of obstruction of the bowels, coming on after a hearty meal. Treatment with enemata brought away two or three round worms. Upon this indication santonin and calomel were given, followed by a Seidlitz powder. This treatment procured the immediate evacuation of a mass of 40 worms, which was followed by the expulsion of others to the total number of 600, in the course of three days. The symptoms of obstruction were thus completely relieved.

J. B. N.

Masters (Walter E.). **Intestinal Obstruction due to *Ascaris lumbricoides*.**—*Jl. Trop. Med. & Hyg.* 1917. Oct. 1. Vol. 20. No. 19. pp. 226–227.

Clinical details are given of a case of intestinal obstruction of obscure origin in which laparotomy had been decided upon. Meantime however the patient with much retching vomited up a knot of roundworms, four in number. The longest measured 18½ inches. During the night as a result of a purgative a large number of *Ascaris lumbricoides* were passed. Relief was immediate, the pain ceased and in three days the patient was again at work.

R. T. L.

Siler (J. F.) & Cole (C. L.). **The Prevalence of Hookworm Disease in the Fourth Texas Infantry, First Mississippi Infantry and First Alabama Cavalry Regiments.**—*Milit. Surgeon.* 1917. July. Vol. 41. No. 1. pp. 77–99. With 6 charts.

A survey was undertaken to determine the influence of hookworm infections on the excessive morbidity rates prevailing in regiments recruited from the Southern States, as compared with those from the Northern States where hookworm disease does not prevail.

Three regiments, from Texas, Mississippi and Alabama, with an approximate strength of 3,400 men gave the following degrees of infection with hookworm :—The Fourth Texas Infantry 6 per cent. First Mississippi Infantry 32 per cent. First Alabama Cavalry 54 per cent. The hookworm infections occurred more commonly in men from rural districts or small towns than in those from cities. An epidemic of measles in the latter two regiments was studied in relation to possible influence of residence and hookworm disease and it was found that the incidence rate of measles in both regiments was decidedly higher than for the urban group, while men with hookworm disease actually came down with measles with twice the frequency of men free from the disease irrespective of prior residence in urban or rural districts. These individuals moreover developed complications—lobar and bronchopneumonia, bronchitis and otitis media—with greater frequency than individuals free from hookworm infection. A detailed analysis of the statistics is made and these suggest strongly that there is a definite correlation between hookworm disease and greater susceptibility to certain transmissible diseases.

R. T. L.

Foster, Jr. (George B.) & Sinclair (Charles G.). **Hookworm Infection as a Medico-Military Consideration : Recent Experiences with Southern Troops during Mobilization on the Mexican Border.**—*Jl. Amer. Med. Assoc.* 1917. Aug. 11. Vol. 69. No. 6. pp. 431–434.

In June 1916 about ten thousand troops, chiefly of the National Guard from the northern, eastern and Pacific states were mobilized at Nogales, Arizona, U.S.A. They had very little sickness. The morbidity rates from August to October averaged 17·9 per thousand while that of the 1,200 regulars included in the 10,000 muster was 23·1 per thousand. During the last week of October a brigade of the Alabama National Guard was mobilized at Nogales. Shortly after

the arrival of these troops the morbidity rate began to soar. During November acute respiratory infections reached epidemic proportions. In December pneumonia and measles became epidemic and continued until March. There were 140 cases of pneumonia with 29 deaths; of measles there were several hundred cases confined almost solely to the Alabama troops. The First Alabama Infantry with 963 men had 84 per cent. on sick report for some cause at some period during the four months October to February. In the Fourth Alabama Infantry 859 out of 1,002 men or 85·7 per cent. reported sick during the same period. There were no epidemics in the civil community nor were the morbidity rates for the other troops abnormally high, although they lived under conditions and environment identical with those of the Alabama troops. All were furnished with the same ration, clothing, bedding, shelter, an unimpeachable water supply, a uniform system for the disposal of excreta and wastes and an ideal camp site. Despite all sanitary measures the morbidity rates remained high. It was apparent that factors not common to the other troops determined the high incidence of disease in the Alabama command. Each Alabama soldier was then examined for malaria and hookworm infection. Blood examinations of 236 soldiers admitted to hospital showed plasmodia in only 0·3 per cent. The hookworm survey was applied to 1,259 men; hookworm infection was detected in 39·9 per cent. The troops in which the incidence of hookworm was greatest came from the low flat river-intersected section of Alabama and it was in these troops likewise that morbidity and mortality was highest.

The authors feel assured that systematic hookworm surveys in all mobilization camps of the Southern States would result in incalculable collateral benefits. They quote the effects produced in the statistics of Bilibid Prison, Manila. The annual death rate from all causes was 234 per 1,000 when the Americans took charge. This was reduced to 75 per 1,000 by general sanitary measures but could not be further reduced. It was then found that many of the prisoners were infected with hookworms. They were freed from their worms by thymol and the annual death rate from all causes fell to 13·5 per thousand.

R. T. L.

Stiles (Ch. Wardell). **Certain Military Aspects of Hookworm Disease.** —*Public Health Rep.* 1917. Aug. 17. Vol. 32. No. 33. pp. 1299–1301.

As the result of an examination of a newly-formed militia unit recently mobilized for war service the author concludes that (1) Recruits may be rejected for remediable conditions due to hookworm and allied infections. (2) Anthelmintic treatment would enable provisional acceptance of recruits rejected because of underweight. (3) Failure to treat the hookworm cases and to *eliminate* at least the severe infections of Strongyloides will undoubtedly result in unjust and preventable punishment for offences due to remediable conditions, considerable physical and mental inefficiency, an unnecessarily high daily "sick call" and premature and preventable pensions. (4) If even light cases of infection with hookworms are sent to the trenches in Europe there is danger of causing a widespread epidemic similar

to the St. Gothard tunnel epidemic, and of leaving in France and Belgium a widespread infection that will take years of work and large expenditure to control and eradicate after the war. (5) These dangers from inefficiency, sickness, epidemics etc. can be prevented to a very great extent if all the recruits or at least those from certain States are systematically examined for intestinal parasites and either treated or discharged as necessity indicates.

R. T. L.

Washburn (B. E.). **Use of Thymol in Treatment of Hookworm Disease.**—*Jl. Amer. Med. Assoc.* 1917. Apr. 21. Vol. 68. No. 16. pp. 1162–1163.

The relative efficiency of thymol when administered in capsules with varying proportions of *lactose* and *sodium bicarbonate* was tested during an intensive hookworm campaign in Trinidad. 325 patients were treated with pure thymol and 12·6 per cent. only were cured by two treatments. 1,112 patients were treated with finely powdered thymol mixed with equal parts of lactose and 49·1 per cent. were cured by two treatments. It was found however that with this latter method 30 per cent. suffered from unpleasant gastric symptoms varying from a burning sensation and slight gastric pain to nausea and vomiting. Later thymol mixed with equal parts of sodium bicarbonate was tested. Of 136 persons treated twice 51 per cent. were cured and of 154 persons similarly treated 43 per cent. were cured. On these results, he states, sodium bicarbonate mixture is superior to and much less expensive than lactose.

R. T. L.

Ferguson (J. E. A.). **The Treatment of Anchylostomiasis in the Peter's Hall Medical District.**—*Brit. Guiana Med. Annual.* Twenty-First Year of Issue. 1915. pp. 43–48.

Whereas 63·3 per cent. of the coolies of the Diamond Estates showed infection before systematic treatment for ankylostome infection, the recent survey showed that the index of infection is now only 19·2 per cent. That the estate yards are practically free from larvae as a result of the establishment of an efficient system of latrines some ten years ago and the repeated medicinal treatment is proved by the almost complete absence of ankylostomes in the young children who rarely leave these yards.

The author has experimented with Infusions, Juice and Decoction of the chenopodium plant. The Juice is rather unpleasant but when sweetened with sugar has been found to kill the worms in from two to four weeks; three ounces are given as a dose to adults; it cures in a much shorter time than the Infusion. The Infusion is made from unbruised fresh green leaves, young stems and flower tops, in the proportion of 4 ozs. to the pint, infused for an hour in an earthenware vessel. Five ounces sweetened with sugar makes a not unpleasant aromatic "tea." This dose three times a day, one hour before meals, rids the intestines of all nematode worms in one or two months. No constitutional disturbances are associated with this long treatment and the "tea" is an excellent stomachic and intestinal tonic. It is

especially valuable in infections associated with albuminuria, old age, pregnancy, extreme anaemia and debility. As the decoction is without aroma and is less palatable than the infusion its action has not yet been tested.

R. T. L.

i. Barnes (W. S.). **The Use of Quassia in Ankylostomiasis.**—*Brit. Guiana Med. Annual.* Twenty-First Year of Issue. 1915. pp. 96–100.

ii. Kennard (C. P.). **The Use of Quassia in Ankylostomiasis.**—*Ibid.* pp. 101–107.

The first paper states that the author has used quassia as a vermifuge for 19 months and that the results have been most satisfactory in most cases. Failures are due to faulty infusion or dilution with food or drink. Over one thousand cases have been treated and a cure has never failed.

The second paper gives the experience of the author from a trial with Dr. Barnes's method. He says that " in no case can I say that I have had a cure." Chlorine water was equally inefficient.

R. T. L.

de Faria (G.). **Nota sobre** *Agchylostoma braziliense* **G. de Faria 1910.** —*Mem. Inst. Oswaldo Cruz.* 1916. Vol. 8. No. 2. pp. 71–73.

The author has recently been able to compare his original specimens of *Ancylostoma braziliense* with samples of *A. ceylanicum* collected by Lt.-Col. Clayton Lane in India. He finds that these two species differ chiefly in the formation of the mouth capsule and the caudal bursa. In *A. braziliense* the internal tooth is relatively much smaller than in *A. ceylanicum*. In the bursa the chief difference lies in the relative length and thickness of the externodorsal ray. In *A. braziliense* this is long and slender while in *A. ceylanicum* it is short and stout. These additional differential characters dispose of the suggestion made by Leiper that these species were apparently identical.

R. T. L.

Porto-Carrero (J.). **Ankylostomose na Marinha Nacional.** [Ankylostomiasis in the National Navy of Brazil.]—*Brazil Medico.* 1917. Aug. 11 & 18. Vol. 31. Nos. 32, 33. pp. 271–272, 279–281.

A paper contradicting a sensational article, which appeared in a non-medical Brazilian journal, to the effect that half the men in the Brazilian Navy were suffering from ankylostomiasis. The author supplies figures to show that this statement is an absurd exaggeration. Out of a total strength of 6,511 men in port, 214 or 3·2 per cent., were found infected with ankylostomiasis, in the year 1916. The author goes on to point out that the general use of sea-water on board ship for all washing purposes, and the provision of filtered water for drinking, make it unlikely that there should be much infection amongst sailors with (the ova of) worms of any species. It appears that the alarming

figures quoted were derived from a report of the medical examination of certain conscripts, who mostly came from the interior of Brazil. The subject seems to be one of merely local interest.

J. B. N.

DE ANDRADE (Astor Dias). **Dystrophias infantis na ancylostomose.** [Arrest of Development in Children suffering from Ankylostomiasis.]—*Ann. Paulist. Med. e Cirurg.* 1916. Dec. Year 4. Vol. 7. No. 6. pp. 133–141. With 5 figs.

A short paper drawing attention to the arrest of development often to be seen in young children suffering from ankylostomiasis, and not apparently attributable to any other cause. Six cases are described in illustration. Not having had the opportunity of making an autopsy in any fatal case, the author is unable to speak with confidence as to the intimate pathology of the condition, but is disposed to attribute it to defects in endocrinal secretion.

J. B. N.

HUME (Edward H.). **Hookworm Control in South China. Based on a Preliminary Study of the Incidence of Hookworm Infection in Hunan Province, China.**—*Jl. Amer. Med. Assoc.* 1917. June 23. Vol. 68. No. 25. pp. 1888–1892.

The control of hookworm in China is complicated by the universal use of human excrement as a fertilizer, the presence of other diseases like schistosomiasis with similar symptomatology, and the concurrence of malaria and other fevers which render it difficult to evaluate the exact morbid significance of each. A preliminary survey in Hunan showed a hookworm incidence of 11·66 per cent. in Changsha, 15·29 per cent. in Changteh, 81·62 per cent. in Pinghsiang and 12·86 per cent. in Sinhwa. The great disparity of the Pinghsiang cases was due to the fact that the bulk of the cases were among underground workers in a deep mine with ideal conditions of moisture, humidity and lack of sanitation. Next to miners the farmers are among the most heavily infected. The mining forces are recruited mainly from the agricultural workers. As it is both financially profitable to market night-soil and agriculturally indispensable to use it for fertilisation in a land where horses and cattle are few, the solution of the hookworm problem lies in the discovery of a practical method of treating human excrement without destroying its fertilising value.

R. T. L.

MACFIE (J. W. Scott). **Arneth Counts in Ankylostomiasis and other Pathological Conditions.**—*Report of the Accra Laboratory for the Year 1916.* pp. 43–53. With 2 charts. 1917. London: J. & A. Churchill.

In malaria and in yellow fever there is a shift to the left of the Arneth count. In ankylostomiasis KNAPP has shown that a shift to the right may take place but he considered his results on the whole equivocal. The author examined the Arneth count of twenty-three inmates of Accra Asylum in whose faeces hookworm ova had been found. In six of these malaria parasites, *P. falciparum*, occurred. " All these cases showed a well-marked shift to the left of the Arneth

count, the index varying from 63·0 to 89·0 averaging 75·8. It was evident, therefore, that any shift to the right there might be in ankylostomiasis was not sufficient to mask the shift to the left that accompanies a malarial infection." Of the remainder, although no malarial parasites were found, it was probable that some had recently had malaria. The Arneth count in these cases varied from 69·0 to 23·0, an average index of 47·0 as compared with an average index of 55·9 found in twenty apparently healthy natives in Accra. The author deduced from his figures that " there appeared unquestionably to be a tendency to develop a shift to the right in the patients infected with hookworms."

R. T. L.

Leger (Marcel). **Résistance globulaire dans l'ankylostomiase.**—*Bull. Soc. Path. Exot.* 1917. Mar. Vol. 10. No. 3. pp. 177–180.

The globular resistance of the blood in ankylostomiasis has so far only been determined in a single case : by Darré in 1909.

From a study of the blood conditions in eight patients infected with *Necator americanus* the author arrives at exactly opposite conclusions from those of Darré. No relation has been found to exist between the increase of the globular resistance and the diminution in the percentage of haemoglobin or the number of red cells. Nor is there any association with the degree of eosinophilia. Ankylostomiasis then is characterised, as a whole, by an increase in the globular resistance ; the haemolysis curve is not only retarded but is greatly prolonged. The hyperresistance recalls that recorded by May (1913) following repeated abstraction of blood. Darré's results are probably attributable to an attack of biliary haemoglobinuric fever which is mentioned in the previous history of his case.

R. T. L.

da Matta (Alfredo A.). **Entero-trichocephalose.** [A Fatal Case of Trichocephaliasis of the Intestine.]—*Brazil Medico.* 1917. Apr. 28. Vol. 31. No. 17. pp. 141–143. With 1 text-fig.

The case of a child, aged four years, taken into hospital for symptoms of advanced anaemia and dropsy. The stools were frequent, loose and streaked with blood, and contained numerous Trichocephalus ova. Marked eosinophilia was present (14·3 per cent.). The child died after being in hospital for rather more than two months, every kind of treatment being unavailing. Post-mortem, large numbers of trichocephali were found adhering to the mucous membrane of the lower portion of the ileum, the caecum and the large intestine, as shown in a photograph. The mucous membrane itself was congested and ecchymosed. Out of a total of 123 worms counted, 52, or 42 per cent., were males.

J. B. N.

Suzuki (K.). [**Relation of *Trichuris trichuria* to Appendicitis.**]—*Tokyo Igakukai Zasshi.* (*Mitteil. d. Gesellsch. z. Tokio*). 1916. Dec. 20. Vol. 30. No. 24. pp. 1–18. With 4 photographs.

[Abstract from Review by R. G. Mills.]

In 2,415 Marines eggs of Trichuris were found in 49·15 per cent. and of Oxyuris in only 0·21 per cent. Details are given of a case operated

upon for appendicitis. Trichuris was found in the lumen and wall of the appendix together with faecal masses and various bacteria. It was impossible to incriminate the parasite definitely as the primary cause, although there was a catarrhal condition of the organ.

R. T. L.

YORKE (Warrington) & BLACKLOCK (B.). **Observations on the Periodicity of *Microfilaria nocturna*.**—*Ann. Trop. Med. & Parasit.* 1917. Aug. 23. Vol. 11. No. 2. pp. 127–149. With 1 coloured plate & 4 charts.

The observations recorded in this paper were made upon an Australian aged 19 years who had since July 1915 suffered periodically from pain in the back accompanied by the passage of clots and of urine resembling milk tinged with blood. A diagnosis of filariasis was made from the finding of microfilariae in the urinary deposit. Blood-films made during the day were practically negative but those made at night contained larval *Filaria bancrofti* in considerable numbers. A series of films was made from the cutaneous blood and from the median basilic vein. The number of larvae occurring at any time in a given quantity of blood is much greater in the cutaneous than in the venous blood. There is a definite periodicity in both and the time of greatest concentration of larvae coincide. The nocturnal periodicity of *M. nocturna* is thought to depend primarily upon periodic variations in the arterial supply of larvae to the cutaneous vessels. The obstruction to the passage of the larvae through the cutaneous vessels plays no essential part in the periodicity. Reversal of the hours of sleep and activity brings about a gradual change in the incidence of the periodicity. After four days the maximum concentration was set back only six hours, after eleven days nocturnal had become completely diurnal periodicity. There is a regular periodicity in the concentration of larvae in the urinary blood which is, however, at its maximum several hours later than that in the cutaneous blood. The majority of the larvae escape into the urine with the blood. [A series of useful charts and a superbly coloured plate illustrate the paper.]

R. T. L.

BREINL (A.) & PRIESTLEY (H.). **Two Unusual Cases of Filariasis observed in North Queensland.**—*Jl. Trop. Med. & Hyg.* 1917. Nov. 15. Vol. 20. No. 22. pp. 253–254.

Filariasis is common in North Queensland and the clinical appearances conform with those seen in other parts of the tropics. The authors record two cases of exceptional interest. A girl, 26 years old, had noticed "during the last four years a swelling in her right groin which decreased in size during a night's rest but became more marked after a day's exertion. She had noticed for some time a few water blisters in the skin of the left side of the lower abdomen. These were easily ruptured by slight rubbing and then discharged a large quantity of pinkish milky fluid. The oozing continued for hours and even days." Examination of the peripheral blood by day was negative. At night *Microfilaria bancrofti* were found in numbers. "An oval

area of skin about 6 by 4 cm., containing the vesicles with the underlying subcutaneous tissue down to the fascia over the external oblique muscle was removed. The adipose tissue contained a rich branching meshwork of large lymphatic vessels and a few seconds after the incision the wound filled with chylous fluid." Microscopical examination of the removed tissues showed throughout the subcutaneous tissue a rich network of hypertrophic lymph vessels, forming here and there dilatations and diverticula filled with coagulated lymph. The vesicles, which communicated with the dilated vessels, were intracutaneous and were covered by a layer of epidermis only, thus explaining how the least injury to a vesicle led to a copious leakage of lymph.

The second case was that of a very well-nourished man of about 47 years of age admitted to hospital and was diagnosed as "acute peritonitis"; the patient's condition did not allow of surgical interference and death supervened ten hours later. At the post-mortem it was found that "the right groin and Scarpa's triangle were the seat of an extensive soft swelling." "The abdominal cavity contained about one pint of pinkish chylous fluid containing numerous small flakes of fibrin." An irregular, ill-defined, flesh-coloured mass of soft tissue consisting of numerous cysts varying in size from 3mm. to 4 cm. in diameter, embedded in oedematous connective tissue, extended below the anterior border of the liver and was connected with a similar mass extending retroperitoneally over the posterior abdominal wall. Thus the whole of the lymphatic system of the retroperitoneal space had become involved in hypertrophy and hyperplasia. The mass consisted partly of distended and cystic degenerated lymphatics and oedematous connective tissue and concealed both kidneys and pancreas. No ruptured wall of the lymphatic varix could be detected but the acute peritoneal irritation and collapse were apparently due to the rupture of the lymphatic varix and the effusion of chylous fluid into the peritoneal cavity. No other pathological lesion was found. A detailed note of the microscopical appearances of the lymphatic varix is given.

R. T. L.

Rose (F. G.). "Filarial" Lymphangitis and its Treatment by Vaccines. —*Brit. Guiana Med. Annual.* Twenty-First Year of Issue. 1915. pp. 7–11.

In countries where the population is infected with *Filaria bancrofti* a condition of acute and oft-recurring lymphangitis is a frequent accompaniment of the filarial infection. Shortly after the outbreak of war a number of would-be recruits were admitted to hospital for the removal of enlarged glands considered to be of filarial origin. Some of these had a history of previous lymphangitic attacks. The author obtained from five of these cases glands in which adult filariae were present. The gland juice proved to be sterile but a streptococcus was found by staining a large number of sections. By using Wright's medium (containing Peptone 1 per cent., Lemco 1 per cent., Human Serum 5 per cent., Glucose 1 per cent. and an amount of alkali fixed by neutralizing to phenol-phthalein and adding 6 cc. of normal acid to each litre of medium) streptococci were recovered in pure culture from fifteen out of seventeen cases of filarial lymphangitis of the leg.

These were simple cases varying from transient redness and tenderness to severe pain with swelling and oedema.

A vaccine was prepared from eight of the most typical strains and was used in ten cases, one of filarial orchitis, one of filarial synovitis of the knee and the others filarial lymphangitis. None showed recurrences and all settled down in a few days after the first injection. A case of filarial septicaemia failed to improve and eventually died.

R. T. L.

Skrjabin (K. I.). *Loa extraocularis* **nov. sp., parasite nouveau de l'œil de l'homme.**—*C. R. Soc. Biol.* 1917. July 28. Vol. 80. No. 15. pp. 759–762. With 3 text-figs.

A female filarial worm 143 mm. in length, was removed by Dr. A. P. Wladytchensky of Ekatérinodare, North Caucasus, from a tumour in the orbital cavity of a peasant 20 years of age. The tumour was about the size of a haricot bean and lay in the inner angle of the eye between the orbital wall and the eyeball. It was moveable, painless, tense and not adherent to the surrounding tissues. The movement of the eyeball was not affected. The tumour was removed and found to contain within a fibrous capsule a delicate actively moving worm.

The parasite resembles at first glance *Filaria conjunctivae* Addario 1885 but differs especially in the structure of the vulva and of the nerve ring and the character of the tail. From *Loa loa* it can readily be distinguished by (1) length, (2) absence of cuticular papillae. With it the following characteristics are shared : (1) the number and disposition of the *buccal* papillae are identical, (2) the vulva is similarly situated behind the junction of oesophagus and gut, (3) there are two post-anal [caudal] papillae in the female, (4) the general topography of the female genital tubes coincides, (5) the anterior end is much thicker than the posterior. On these grounds the author includes the new parasite as a second species in the genus *Loa*. The worm is immature, containing neither eggs nor embryoes. The greatest breadth of the body is 0·612 mm.—just behind the vulva. The cuticle is finely striated transversely. The oesophagus measures 0·935 mm. by 0·085 mm. The nerve ring is 0·272 mm. from the anterior extremity. The anus is only 0·1 mm. from the posterior end. The vulva opens 2·04 mm. from the anterior extremity.

R. T. L.

Dubois (A.). *Onchocerca volvulus* **et l'Eléphantiasis dans le Haut-Ouellé (Congo Belge).**—*Bull. Soc. Path. Exot.* 1917. Apr. Vol. 10. No. 4. pp. 365–371.

The author had previously reported on the distribution of *O. volvulus* in Bas-Ouellé and on the relation of this filaria to elephantiasis [see this *Bulletin*, Vol. 8, p. 201]. Recently he had an opportunity of visiting Haut-Ouellé (Uele in Belgian maps) and of collecting further information which confirms, generally, the results of Ouzilleau. Of new cases of genital elephantiasis 48 were met with ; 43 of these had parasitic nodules and four were diagnosed as infected with *O. volvulus* after puncture of the inguinal glands. In one only were there no

nodules and four gland punctures were negative. Elephantiasis of the foot was seen in four other cases in which parasitic cysts were also present. The two series give a combined total of 105 cases of elephantiasis (three of the vulva, eight of the lower limbs, 94 of the scrotum and penis).

The geographical coincidence of this filarial worm and elephantiasis is very striking. In the Amadi-Suronga region 398 out of 571 adults i.e., 68 per cent., and of 152 children 22 per cent. were subject to parasitic nodule; fifty cases of elephantiasis were seen. Around Niangera *O. volvulus* is still frequent and this prevalence continues as far as Dungu; elephantiasis is common in this district. From Dungu to Faradje and Aba the volvulus cases appeared to diminish in number.

Keratodermia was commonly seen in the onchocerciasis zone. Juxta-articular nodosities were very rare.

The author concludes that among the riverine population of the Ouellé-Bomou basin a form of elephantiasis is associated with infection with *Filaria volvulus* and is not to be confused with that resulting from *F. bancrofti.*

R. T. L.

Gupta (Jai Jai Ram). **Guinea Worm and Iodine.** [Correspondence.] —*Indian Med. Gaz.* 1917. Nov. Vol. 52. No. 11. p. 419.

Fifty cases of guineaworm have been successfully treated by the injection of tincture of iodine into the abscess. In the majority of cases cure has resulted in two days from a single injection of three grains [*sic*]. Where there is much pus the abscess is freely incised, irrigated with iodine lotion and the cavity wall painted with tincture of iodine. Iodine dressings are used. The author believes that the iodine injection has a prophylactic action as worm abscesses are subsequently rare "although the general belief is that one must get seven abscesses before the poison dies out."

R. T. L.

Janicki (Constantin). **Experimentelle Untersuchungen zur Entwickelung von *Dibothriocephalus latus* L. I. Ueber negative Versuche, junge Forellen, Hechte und Barsche direkt mit Flimmerembryonen zu infizieren.** [Experiments on the Development of *D. l.* (I) Failure to infect Young Trout, Pike and Perch with Ciliated Embryoes.] —*Cent. f. Bakt.* 1. Abt. Orig. 1917. July 31. Vol. 79. No. 7. pp. 443–461.

Bothriocephalus eggs from human faeces give rise to swimming embryos in from thirteen days to five weeks at summer temperature. Attempts, of which details are given in the paper, were made to infect over 100 examples of trout under three months old but proved negative. Similarly 70 pike under two months were unsuccessfully submitted to infection. Daphnids were also found immune. A smaller series of experiments were made on the perch and burbot. The author concludes that an intermediary host not yet found is an essential preliminary and that the fish acts as only the *second* intermediate host in the life cycle of *D. latus.*

R. T. L.

Levy (M. D.) & Wall (Dick P.). *Bothriocephalus latus* **Infection — Report of a Case.**—*Southern Med. Jl.* 1917. July. Vol. 10. No. 7. pp. 546–547.

In reporting a case of Bothriocephalus in 1916 Singer was able to collect only thirty other records in American literature [see this *Bulletin*, Vol. 8, p. 192]. The present case presents no unusual features but is deemed worthy of a place in the literature of the subject. The infection is said to be fairly common among the Finns of the North Western States and the present case is a Finn who had been in the United States for five years. For four years he had passed segments of tapeworm ; sometimes the portions of strobila measured as much as fifteen feet in length. Large numbers of Bothriocephalus eggs were found in the stool. There was an entire lack of subjective symptoms. Blood examination gave 3,240,000 red corpuscles, 90 per cent. haemoglobin, colour index 1·4x per cent. ; differential count gave only 2 per cent. eosinophilia. Treatment with ethereal extract of male fern removed two large Bothriocephalus worms, each twenty-four feet long. The stools were subsequently free from ova.

R. T. L.

Yoshida (Sadao). **The Occurrence of *Bothriocephalus liguloides* Leuckart, with Especial Reference to its Development.**—*Jl. Parasit.* 1917. June. Vol. 3. No. 4. pp. 171–176. With 1 fig.

About fifty-five cases of *Ligula mansoni* (*Bothriocephalus liguloides*) have been recorded since Manson found the first specimen in 1882. The author accidentally came across thirty-six specimens of this larval cestode in the body cavity and body wall of a cat which died in an extremely undernourished condition. The fresh specimens were extremely mobile and measured up to 75 cm. in length. These were fed to two young cats which unfortunately died five days later from some unknown cause and no parasite was found in the alimentary canal on dissection. Later another specimen was obtained from the abdominal wall of a patient and was fed to a laboratory bred dog 27 days old. After two months a large Dibothriocephalus measuring 2·5 metres in length and 12 mm. in maximum breadth was recovered. The eggs differ markedly from those of *D. latus* but in this character only can the worm be positively distinguished. The author thinks it probable that the dog harbours two species of adult Bothriocephalus worms ; one the wellknown *D. latus* from the eating of salmon-trout, the other the adult form of Manson's liguloid larva.

R. T. L.

Kothary (P. T.). **Hydatid Disease in Kathiawar.**—*Indian Med. Gaz.* 1917. Aug. Vol. 52. No. 8. pp. 273–275.

Hydatid has only been recorded three times during the past seven years in the Rajkot Hospital, India. Notes of these cases are now given. The first was in a woman aged 30. The tumour, which was the size of a coconut, lay on the back below the scapula. It was movable but the overlying skin was adherent. The cyst was believed to be sebaceous but on incision was found to contain daughter cysts

The other cases were suppurating hydatid of the liver with fever and were diagnosed as abscess of the liver. The true nature of the lesion was discovered at operation.

R. T. L.

Ingram (A.). **An Examination of the Inmates of the Accra Asylum for Parasitic Infections.**—*Report of the Accra Laboratory for the Year 1916.* pp. 87–89. 1917. London: J. & A. Churchill.

The faeces of 106 persons, the inmates of the Accra Asylum during September and October 1916, were examined. A single preparation of faeces from each individual was made. Oxyuris ova were found once; Hookworm ova 36 times (33·9 per cent.); *Ascaris lumbricoides* ova 68 (i.e., 64·1 per cent.) times; *Trichuris trichiura* ova 34 times (32 per cent.); *Taenia saginata* ova 10 times (9·4 per cent.); *Strongyloides stercoralis* 14 times (13·2 per cent.). No parasites or eggs were found in the urine. In the "night" blood of 61 of the inmates of the Asylum sheathed microfilariae (*M. bancrofti* ?) were found in seven cases, unsheathed blunt-tailed embryos (*M. perstans*) in three cases, once in association with *M. bancrofti*. The "day" blood of the same persons showed microfilariae only in a single instance. These were both sheathed and unsheathed embryos and were presumed to be *M. loa* and *M. perstans* as the sheathed forms did not occur in the blood at night.

R. T. L.

Commes (Ch.). **L'eau du Niger et l'helminthiase intestinale.**—*Bull. Soc. Path. Exot.* 1917. Oct. Vol. 10. No. 8. pp. 730–731.

The natives of Bamako, Upper Senegal, are commonly infected with intestinal helminths. The Europeans there are likewise affected though this is frequently overlooked. The drinking water, taken from the Niger, is the particular source of these infections. The authors have periodically examined the deposit resulting from the addition of alum to ten litres of river water and have found microscopically, after centrifugation, the eggs of Trichocephalus, Ascaris and Ankylostomes. The Trichocephalus eggs occur in greatest abundance in the dry season, those of Ascaris during the winter months. The Ankylostome eggs are about as numerous in the one season as in the other.

R. T. L.

Clapier (N.). **Notes sur le parasitisme intestinal par les Nématodes dans la zone frontière du Liberia et de la Guinée.**—*Bull. Soc. Path. Exot.* 1917. July. Vol. 10. No. 7. pp. 560–563.

The Franco-Liberia Boundary Commission, 1914–1916, examined the stools of 154 children, of ages ranging from five to fifteen, attending various centres in the military region of French Guinea or in widely scattered villages on the Liberian frontier (ranging from between 10·30° to 13° W. and 7·15° to 9° N.). The observations were made during the dry season, i.e., from October to March. Ankylostomes were detected in 116 cases, i.e., 75.3 per cent., *Ascaris lumbricoides* in 57, i.e., 37 per cent. and Trichocephalus in 54, i.e., 35 per cent.

Strongyloides occurred in at least ten cases and in one instance the larvae were in very large numbers. The patient had severe diarrhoea with bloody stools; the symptoms and he larvae disappeared after some days as a result of the administration of a mixture of thymol and calomel. The author states that *A. duodenale* [?] was found in large numbers in the intestine of a cachectic cat. Both *A. duodenale* and *N. americanus* occurred in the human cases; the latter was verified by finding the adults, the former was inferred from the finding of two eggs of different length in the stools.

Of 11 Europeans who had lived in the district for more than one year only three were infected and these harboured Trichocephalus only.

R. T. L.

Leger (Marcel). **Parasitisme intestinal à la Guyane française dans la population locale et dans l'élément pénal.**—*Bull. Soc. Path. Exot.* 1917. July. Vol. 10. No. 7. pp. 557–560.

Advantage was taken of the recent mobilisation of young recruits in Cayenne for service in France to ascertain the degree of helminthic infection among the indigenous population. The stools of 242 soldiers of from 18 to 34 years of age were examined and 82·7 per cent. were found to be carriers of helminths. Ankylostomes occurred in 62 per cent., Trichocephalus in 41 per cent. and Ascaris in 38 per cent. The degree of infestation with *Schistosomum mansoni* has been the subject of a recent note by the author [see this *Bulletin*, Vol. 10, p. 115]. It is noted that in accordance with the wise instructions of the Under Secretary of State of the Health Ministry the hookworm carriers had to be systematically treated before they left the Colony.

Among the convicts Brimont in 1909 had noted a hookworm infection of 69 per cent. and Blin recorded 74 per cent. as carriers. The author found 253 carriers of helminths in 266 individuals, i.e., 95 per cent. Ankylostomes occurred in 92·5 per cent., Trichocephalus in 30 per cent. and Ascaris in 17 per cent. In two cases there were Oxyuris and in two others were *Schistosomum mansoni*. An egg not yet definitely diagnosed was seen in three cases.

Ascaris carriers are uniformly distributed throughout the three French colonies in America. In Guadeloupe Trichocephalus is common while Ankylostomes are of like frequency in Guadeloupe and French Guiana and uncommon in Martinique.

R. T. L.

Garcia (Faustino). **Common Intestinal Parasites.**—*Philippine Jl. Sci.* Sec. B. Trop. Med. 1917. Jan. Vol. 12. No. 1. pp. 25–32.

From the records of the stool examinations made at the Southern Islands Hospital between April 1913 and November 1916 the author has obtained statistical information as to the prevalence of infections by intestinal parasites among the Filipinos of the Vesayan Islands of the Philippines. 1,603 patients were investigated, 66·5 per cent. were infected. In 41 per cent. there was Trichuris infection alone; in 31 per cent. hookworm infection alone; in 27 per cent. Ascaris infection alone. Strongyloides was noted seven times, Taenia six

and *Hymenolepis nana* once. The symptoms of intestinal infections are indefinite among the Filipinos and it would seem that these people are not as susceptible to intoxication from hookworm as the white race.

Ascaris infection is greater in the city of Cebu than in the towns of the Cebu province but in hookworm the incidence is the reverse.

R. T. L.

Bowman (F. B.) & Saylor (P. D.). **Report on Examinations of Faeces of Chinese Labourers.**—*Lancet.* 1917. Nov. 24. pp. 791–792.

From an examination of 340 specimens of faeces from Northern Chinese labourers it was found that parasitic infections occurred in the following percentages: *Ascaris lumbricoides* 88 per cent. (225 infected), *Ankylostoma duodenale* 11 per cent. (38 infected), *Oxyuris vermicularis* 2 per cent. (7 infected), *Strongyloides stercoralis* 1 per cent. (3 infected) and *Trichuris trichiura* 4 per cent. (15 infected). Only one preparation was made and examined unless the first was entirely unsatisfactory. The sputum of several cases showed a considerable amount of blood but gave a negative result as regards Paragonimus ova. From the above the authors conclude that "Hookworm infection is very prevalent and calls for attention."

"The winter and early spring are the seasons when pneumonia, measles &c. appear, and the possibility of these diseases appearing among the Chinese is not remote. Hookworm infection should be taken into account as a devitalising agent, and thus a predisposing factor in the seriousness of these conditions."

R. T. L.

Bardachzi (Franz) & Barabás (Zoltán). **Auffallend häufiges Vorkommen von Eingeweidewürmern bei Kriegsteilnehmern.** [Remarkable Percentages of Worm Occurrence in Soldiers.]—*Münch. Med. Woch.* 1917. Apr. 24. Vol. 64. No. 17. pp. 570–572.

A study of the stools of 526 persons (403 soldiers and 123 civilians) in Eastern Galicia showed that 46·6 per cent. were infected with Trichocephalus, 33·6 per cent. with Ascaris, 2 3 per cent. with Oxyuris. The results lead the author to the conclusion that systematic microscopical examination of the faeces is advisable and may reveal a simple explanation for many cases of obscure anaemia, indigestion, debility and exhaustion, and others showing nervous symptoms.

R. T. L.

Fricke (Winfried). **Vergleichende Wurmeier-Untersuchungen in Mazedonien.** [Comparative Investigations on Helminth Eggs in Macedonia.]—*Deut. Med. Woch.* 1917. July 5. Vol. 43. No. 27. pp. 845–847.

From an examination of 500 stools from Macedonian, Bulgarian, Macedonian-Turk soldiers and natives of Albania and Macedonia the author finds 53 per cent. infected with helminths. The species found was *Ascaris lumbricoides, Trichuris trichiura, Oxyuris vermicularis, Taenia solium* and *Hymenolepis nana.* A series of statistical tables show the relative frequency of these eggs in the stool when sought for by different methods.

R. T. L.

MATSUOKA (Yeisaku). **On the Pathology of Worm Infection of the Vermiform Appendix.**—*Jl. Path. & Bact.* 1917. Apr. Vol. 21. No. 2. pp. 221–247. With 5 plates.

From a study of 103 appendices removed by operation at Freiburg in Breisgau and 23 obtained post-mortem in Edinburgh the author concludes that in these cases worms were "neither directly nor indirectly the cause of acute or of old appendicitis. This conclusion applies equally to adults and children." Oxyuris was found in 3 out of 33 recently inflamed appendices which had been operated on in Freiburg for acute appendicitis and in 26 out of 70 normal or slightly inflamed appendices. Of these 26 only one was abnormal being a case of old appendicitis. Only two appendices contained Trichocephalus and of these one only was inflamed. In the Edinburgh series none of the appendices with Oxyuris and Trichocephalus showed inflammation. In 45 cases which were unnecessarily operated upon 25 contained worms and in the operation cases of another clinic this percentage was found to be 91·7 per cent. In these cases with worms the appendices showed no inflammatory changes but clinical symptoms resembling appendicitis nevertheless occurred. In this disease—called pseudo-appendicitis zooparasitaria—pathognomonic symptoms do not occur but there are characteristic signs, viz., "absence of fever (occasionally very slight fever), faint sensibility to pressure, and spontaneous subjective sensation of pain in the ileo-caecal region, with the presence of worms or eggs in the faeces."

In the appendix the author differentiates true worm canals, smooth walled spaces formed by the movement of the worm through the mucosa, and RHEINDORF'S worm canals which are artificial fissures and may be avoided by embedding in celloidin for section cutting. Oxyuris is fairly common, Trichocephalus rare in the appendix: sometimes single specimens occur and may be overlooked.

R. T. L.

HALL (Maurice C.) & FOSTER (Winthrop D.). **Oil of Chenopodium and Chloroform as Anthelmintics. Preliminary Note.**—*Jl. Amer. Med. Assoc.* 1917. June 30. Vol. 68. No. 26. pp. 1961–1963.

From experiments upon dogs the authors find that oil of chenopodium should be administered with large doses of castor oil and that when so given it is an uncommonly effective and quite safe anthelmintic against ascarids. It is considered inadvisable to allow chenopodium oil to lie for hours in the digestive tract or to delay the use of castor oil. In the divided doses as usually prescribed the chenopodium is probably absorbed. On the other hand these divided doses aid in protecting the patient by allowing the development of idiosyncratic intolerance and a consequent cessation of the treatment.

Chloroform has been found decidedly superior to thymol or oil of chenopodium as an anthelmintic against hookworms. It is considered as safe as thymol or other effective anthelmintic in these cases. An anthelmintic dose of chloroform of 2 to 3 cc. [for dogs] should not be repeated within three weeks. There are certain lesions of the liver, kidneys and heart in which the use of chloroform would be contra-indicated.

The combination of chenopodium and chloroform does not apparently enhance the anthelmintic value of chloroform but the chenopodium will assist in removing the ascarids that usually are present in hookworm infections in dogs. R. T. L.

Heiser (Victor G.). **The Administration of Chenopodium.**—*Milit. Surgeon.* 1917. Aug. Vol. 41. No. 2. pp. 253–254.

Recent investigations have shown conclusively that chenopodium oil is a most effective remedy for ankylostome and ascaris infections. It has also been successfully administered for tapeworms and for "encysted" amoebic dysentery. It is regarded by many as more pleasant to take than thymol.

A number of deaths following upon its administration have however recently been reported from Ceylon and Mississippi and one from Panama. Numerous reports of deafness extending over a period of months and other untoward symptoms have been received from the West Indies, Federated Malay States and Korea. On the other hand in Sumatra the oil has been given over 300,000 times without any untoward occurrence or symptom. The method of administration in Sumatra differs from that elsewhere in that there are no dietary restrictions; no preliminary purgative; castor oil is used instead of magnesium sulphate and the capsules are only filled just prior to use.

Darling and Barber have recently drawn attention to the danger of cumulative effects from chenopodium and advise that treatment be not repeated under ten days. Salant notes that when the oil is administered to animals at a time when hunger contractions of the stomach are taking place poisoning will result from much smaller doses; moreover castor oil acts like any oil as a neutralizant. Clinical details are given of two fatal cases in Ceylon. R. T. L.

Leiper (R. T.). **Two Helminthological Notes.**—*Trans. Soc. Trop. Med. & Hyg.* 1917. July. Vol. 10. No. 8. pp. 194–196. With 2 text-figs.

Note on the Integument of the Bilharzia Miracidium.—Specimens fixed by Dr. Ashworth in corrosive sublimate and stained with haematoxylin several years ago now "give a beautiful picture of the skeletal thickenings of cuticle supporting the integument." The two illustrations show this.

A Simple Method for the Preservation of Helminth Ova in Faeces.—Two methods in fact are given:—

"Alcohol, 70 per cent., with 5 per cent. glycerine added, is raised to boiling point. Fluid faeces—or faeces made fluid by dilution with normal saline—are poured into the boiling alcohol, stirred, and then set aside to inspissate in a warm place. When the faeces have become a sticky mass, sufficient pure glycerine is added to make a soft paste."

And: "To any quantity—say, half an ounce—of fluid faeces an equal bulk of Langeron's Lactophenol is added. The whole is intimately mixed by vigorous shaking. This mixture will form a pasty jelly, and will keep indefinitely. A permanent microscopical preparation can be made at any time by stirring a small portion into a drop of glycerine and ringed with melted glycerine jelly, a cover-glass is placed on the jelly, and when this is set the preparation is completed by sealing with goldsize. Langeron's Lactophenol consists of carbolic acid one part, lactic acid one part, glycerine two parts, and water one part. The faeces used should be of a creamy consistence. If solid they should be diluted with normal saline."

A. G. B.

Hookworm Campaigns (1916).*

Active measures for the control and prevention of hookworm infections were in actual operation throughout 1916 in the following tropical and subtropical regions† :—Antigua, Grenada, St. Lucia, St. Vincent, Trinidad, British Guiana, Dutch Guiana, Costa Rica, Guatemala, Nicaragua, Panama, Salvador and Ceylon, under the auspices of the International Health Board. In Brazil, Barbados, British Honduras, Siam, Malaya, Java, China and Fiji, preliminary surveys were made as a basis for future work. As no reference is to be found to the campaign in Egypt this would appear to have been suspended. In India a pioneer campaign in the tea estates of Assam was successfully carried out under the independent auspices of the Indian Research Fund Association.

Antigua (1916).‡

The intensive plan of campaign was in operation during the year firstly under the direction of Dr. H. L. Kearney and latterly under Dr. Don. M. Griswold. By December 31st, 1916, the work which commenced in September 1915 had been completed in the districts, York Valley, Belvidere and All Saints. The following table covers this period of fifteen months.

	York Valley	Belvidere.	All Saints.	Total.§
1. Census	1,957	884	4,724	7,565
2. Examined	1,943	860	4,674	7,477
3. Found infected ..	531	254	1,444	2,229
4. Given first treatment	471	241	1,342	2,054
5. Cured..	450	219	1,304	1,973
Percentage infected cured	84·7%	86·2%	90·3%	88·5%
Percentage of treated cured	95·5%	90·9%	97·2%	96·1%
6. Removed from Area (or dead)	27	7	33	97
7. Remaining in Area uncured	54 (10·2%)	28 (11·0%)	107 (7·4%)	189 (8·5%)
(a) Not located ..	—	3	11	14
(b) Refused ..	10	4	10	24
(c) Medical reasons	36	21	86	143
(d) Under treatment	8	—	—	8

* For 1914 see this *Bulletin*, Vol. 8, pp. 525–535; for 1915, Vol. 9, pp. 281–292.

† Rockefeller Foundation. International Health Board. Third Annual Report. Publication No. 6. Jan. 1, 1916–Dec. 31, 1916. [Dr. Wickliffe Rose, Director-General.] 1917. New York: 61, Broadway.

‡ *Loc. cit.* pp. 54–61.

§ As in the previous years the statistical tables are composite and are based by the reviewer on two or more tables given in the original report.

Of the total population of the districts no less than 98·8 per cent. were examined; 29·8 per cent. of these were found to be infected. First treatment was administered to 92·1 per cent. of those infected and of these 96·1 per cent. were cured. Only 1 per cent. refused to be cured and only 8·5 per cent. remained as possible foci of infection when the campaign closed.

The native rural population of Antigua is almost entirely without latrine accommodation. Of 1,830 homes in the three areas dealt with only 38 were found provided with latrines. By the end of the year latrines were installed in 32 additional homes. Eighty-five per cent. of the people of the island, excluding St. Johns, are full-blooded negroes, who live mainly in rural villages and engage in agriculture. Sugar is the chief crop. The island was divided into six districts and of these the three dealt with during 1916 cover the southern portion of the island where the population is most dense.

British Guiana (1916).*

In September 1916 operations begun in the Plaisance area in October 1915 were brought to completion. Those begun in another area will be dealt with in the succeeding report. The Plaisance area extends eastwards along the northern coast for twelve miles from Georgetown. It varies in width from one to three miles. The land is flat and lies several feet below sea-level at high-tide, being protected by dykes. Drainage is effected by a series of canals which escape through the sea-wall and discharge at low tide. These prove inadequate at times and large areas are flooded. The area is devoted in part to rice-culture.

	Plaisance Area.
1. Census	18,951
2 Examined	18,498
3. Found infected	9,808
4. Given first treatment	8,263
5. Cured	6,225
Percentage of infected cured 63·5%	—
Percentage of treated cured ..	—
6. Removed from Area (or dead)	1,461
7. Remaining in Area uncured	2,122
(a) Refused 633	(21·6%)
(b) Medical Reasons .. 587	—
(c) Under treatment .. 902	—

At the close of the campaign the number of persons remaining as foci of infection was 21·6 per cent. of those infected.

As compared with the districts of Peter's Hall and Belle Vue previously treated the percentage of persons cured in the Plaisance

* *Loc. cit.* pp. 62–74.

Area is smaller. This is explained by the fact that the East Indians are busily engaged in rice-growing and as a rule will not give even one day for treatment during the planting and harvesting seasons, which occupy four or five months of the year.

Sanitary Improvement.—During 1916 4,900 homes were inspected; 2,409 (49·2 per cent.) were found already provided with latrines. At the close of the campaign only 55 additional latrines had been installed. The villagers objected to the enforcement of sanitary laws and refused to take further treatment unless the inspectors were withdrawn. This was done but steps are now being taken to enforce the sanitary regulations.

The value of well-directed efforts at sanitary improvement, in conjunction with the treatment of sufferers from hookworm disease is well illustrated by the Georgetown Hospital Returns for 1914, 1915, 1916. The number of patients admitted during 1916 from the Peter's Hall and Belle Vue districts, in which hookworm campaigns were conducted in 1914 and 1915, was 31·5 per cent. lower than the number admitted in 1914, i.e., prior to these campaigns. In contrast the admissions during 1916 from untreated districts fell by only 6·5 per cent. while those from the city of Georgetown rose 14·7 per cent.

Dutch Guiana (1916).*

Work for the relief and control of hookworm disease commenced here in October 1915 and continued under the supervision of Surgeon-General Honourable A. L. Schenck throughout 1916. The entire population lives on a strip of coastal plain or mud flat lying along the northern coast and extending for about fifty miles inland. The capital Paramaribo has a population of 40,000 and there are about 155 estates and settlements (each having a population of more than fifty persons) which comprise an additional 38,055 souls. Twelve estates and one settlement lying along the Commewyne river in the Lower Commewyne Area were dealt with during 1916 on the intensive plan.

1916.	Commewyne Area
1. Census	4,470
2. Examined	4,411
3. Found infected	3,900
4. Given first treatment	3,667
5. Cured	3,233
Percentage of infected cured 82·9%	—
Percentage of treated cured 88·2%	—
6. Removed from Area (or dead) ..	330
7. Remaining in Area uncured	337 (8·6%)
(a) Refused 33	—
(b) Medical reasons .. 202	—
(c) Under treatment .. 102	—

* *Loc. cit.* pp. 75–82.

The effectiveness of the work is borne out by the fact that of 3,900 infected persons in the area only 8·6 per cent. remained at the close of the campaign as foci of infection. More than half of these could not be cured for medical reasons.

The *sanitary improvement* during the course of the campaign was most marked, for whereas at its commencement only 17·8 per cent. of the homes had latrine accommodation during its progress the accommodation was increased to 88·5 per cent. From all the estates reports indicated that the labourers showed marked improvement in general health and in working capacity. On one estate five men were taken at random and it was found that their average wage per working day for the three months after treatment was 34 per cent. higher than for a like period prior to treatment. On another estate the average daily wage for a period of two months after treatment of six men, chosen at random, was found to have exceeded by 38 per cent. that for a period of three months before treatment.

Grenada (1916).*

A change of method was initiated during the year in Grenada. The first eight months were spent in bringing to a close the operations on the dispensary plan which had been begun in 1915 in the Mt. Moritz, St. David's and St. Andrew's areas. From September until the close of the year the intensive method was in operation in five areas, viz. Dougaldston, Concord, Marigot, Grand Roy and Mt. Nesbit, which include the whole of St. John's Parish south of the Dougaldston River. In the Dougaldston area only was the campaign completed by the end of the year. This area consists of one large cocoa estate situated about half a mile from Gouyave and about twelve miles from St. George. The land rises rapidly from the sea-level to the high hills near the central ridge of the island. The people, 426 in number, are mostly negroes with a few East Indians. About 150 live in barracks and an equal number on the main road near the coast; the rest have small houses scattered about the estate which embraces an area of about two square miles.

The results of the year's work given in the subjoined table show the very striking contrast between the percentage of persons cured by the two methods of work. In the dispensary scheme only 20·4 per cent. were cured as compared with 77·1 per cent. under the intensive scheme.

	Dispensary method.	Intensive method (Dougalston).
1. Census	—	426
2. Examined	4,886	426 (100%)
3. Found infected ..	3,885	341 (80%)
4. Given first treatment	3,807 (98%)	340 (99·7%)
5. Cured	776 (20·4%)	262 (77·1%)

**Loc. cit.* pp. 83–89.

In the five areas surveyed under the intensive method there were 2,620 persons in 671 homes, only 75 of which were found already provided with latrines.

St. Lucia (1916).*

Activities were confined to the Castries Valley area and a strictly intensive plan of campaign was followed. Work had been completed in a third of this area in 1915; the remainder was completed during 1916. The whole area embraces a population of 10,482 persons of whom 56·6 per cent. were residents in the town of Castries, the rest being suburban rather than rural residents. Over 98 per cent. were coloured. The population dealt with during 1916 numbered 6,214. The work continued under the supervision of Dr. S. Branch.

1.	Census	6,214
2.	Examined	6,003
3.	Found infected	2,336
4.	Given first treatment	2,201
5.	Cured	1,904
	Percentage of infected cured 81·5%	—
	Percentage of treated cured 86·5%	—
6.	Removed from area (or dead).. ..	121
7.	Remaining in area uncured	311
	(a) Refused 80	(13·3%)
	(b) Medical reasons .. 15	—
	(c) Under treatment .. 216	—

"The failure to treat all the infected persons until they had been cured was due almost wholly to the migratory habits, procrastination and shiftlessness of certain members of the negro labouring population." It was noted that as the work proceeded farther from the town the suburban districts showed a steady increase in infection. The inhabitants of Castries dump their refuse into a sewage barge which anchors nightly in the river. Additional provisions are being arranged for the following year. In the outlying parts there are 411 houses of which 226 have satisfactory conditions of disposal.

In his report† to the Governor for the half-year ending June 1916, Dr. S. Branch states that all persons travelling third class from St. Lucia by the Quebec Steamship Co. are now required to produce certificates that they are free from hookworm infection. This quarantine restriction has proved a valuable advertisement for the local campaign as no one likes to risk the penalty of being returned as an undesirable owing to infection with this parasite.

Recruits for Imperial service were examined. The first batch had shown 67·2 per cent. of infections. The second batch gave 75 per cent. The higher percentage in the later recruits was probably due to the

* *Loc. cit.* pp. 90–98.

† Report by Dr. S. Branch received in Colonial Office 31st August, 1916.

fact that more were natives of the colony. "The racial immunity enjoyed by the black-skinned peoples from the extreme ravages of this disease are here amply shown. These men represent the able-bodied youth of the colony chosen for their physical fitness and freedom from other diseases. In only one case was a recruit rejected on account of his infection. The others were treated with little opposition."

Dr. Branch emphasises the need of unceasing education of the children in sanitary ideas. He is convinced that "the erection of closets, privies and latrines and their unceasing supervision will not lead us to a successful issue unless we can educate up the generations to their unfailing use. It is very disappointing to see the children on their way to school performing their toilet on the public highroads, under culverts and bridges."

St. Vincent (1916).*

The territory dealt with up to the close of 1916 embraced the windward side of the central mountain range extending for a distance of eleven miles from Kingstown. This district includes the most populous part of the island. For purposes of the campaign this region was subdivided into five smaller areas, Calliaqua, Belair, Sion Hill, Stubbs and Mesopotamia. The campaign in Calliaqua and Belair was completed in 1915 [see this *Bulletin*, Vol. 9, p. 288.] Work in the remaining three areas was completed during 1916 by Dr. P. B. Gardner under the general supervision of the Colonial Surgeon Dr. C. H. Durrant.

	Sion Hill.	Stubbs.	Mesopotamia.	Total.
1. Census	1,880	2,362	3,325	7,567
2. Examined	1,853	2,346	3,295	7,494
3. Found infected ..	1,120	1,063	1,879	4,062
4. Given first treatment.	1,030	978	1,740	3,748
5. Cured..	907	887	1,520	3,314
Percentage of infected cured	—	—	—	81·6%
Percentage of treated cured	—	—	—	88·4%
6. Removed from area (or dead)	21	11	27	59
7. Remaining in area uncured	192	165	332	689 (17%)
(a) Refused .. 150 (3·7%)	—	—	—	—
(b) Medical reasons 161 (4%)	—	—	—	—
(c) Under treatment 378 (9·3%)	—	—	—	—

* *Loc. cit.* pp. 90–112.

No compulsion is used in St. Vincent to secure sanitary improvement. The Government makes and sells a fly-proof box to be placed over a pit and the sanitary staff instals the box for every purchaser who digs a pit.

The number of homes inspected was 1,519. Of these 309 had latrines already installed and 147 provided new latrines during the year. On December 31st, 1916, there remained in the areas Belair, Sion Hill, Stubbs and Mesopotamia 992 homes (57·1 per cent.) without latrine accommodation.

Trinidad (1916).*

The campaign was carried out under the direction of Dr. B. E. Washburn from the commencement of the year until May when Dr. G. C. Payne replaced Dr. Washburn who proceeded on leave.

The Borough of Tacarigua was mainly the sphere of active operations during the year. Operations in a second area further east along the Government Railway were set in progress but these were not completed by the close of the year.

In Tacarigua work was undertaken in four adjoining areas: Tunapuna, Tacarigua, Arouca and Lopinot. The first three areas extend eastward for a distance of about six miles along the Government Railway running from Port of Spain to Sangre Grande. The Lopinot area is located in a range of hills in the northern part of the borough and is contiguous with the Arouca area on its southern boundary. Almost all the inhabitants of these four areas are engaged in cocoa or sugar cultivation, some as labourers but the majority as small holders. About 40 per cent. are East Indians, the remainder are of mixed negro or European origin.

The campaign in Trinidad commenced in August 1914 and was conducted at first according to the dispensary plan. Since May 1915 the strictly intensive method was followed. The total number of persons examined up to December 31st, 1916, was 23,651 (viz., 10,204 under the dispensary scheme and 13,447 under the intensive scheme). Of this total 68·3 per cent. were found infected; 83·8 per cent. of these were given first treatment. Of the total, 7,636 cured, viz., 79 per cent. of those given first treatment, were under the intensive method and 11·6 per cent. under the dispensary method.

The sanitary condition of the village of Tunapuna is above that of the average tropical town. An ample water supply is piped along the streets and into some of the houses. The village is well drained. All but 31 of the houses were found to be already provided with satisfactory latrines at the commencement of the campaign and in these new latrines have since been installed by order of the authorities.

In the village of Tacarigua there is a similar water supply and the land is well drained by roadside gutters. In Arouca the people depend on wells, streams and collections of rainwater but the drainage is also good. Practically all the houses with latrines were within the boundaries of the principal towns. Of 3,395 homes inspected 71 per cent. were found provided and at the close of the campaign only 229 additional latrines had been installed. The Government has now

* *Loc. cit.* pp. 113–126.

placed the entire responsibility for sanitary improvement in the hands of the local authorities and has given an assurance that this work will be rigorously pushed.

Trinidad.

Intensive work: Detailed Results of Examination and Treatment in Areas completed during 1916.

	Tunapuna.	Tacarigua.	Arouca.	Lopinot.	Tacarigua Orphanage.	Total.
1. Census	7,428	2,623	3,260	621	224	14,156
2. Examined	6,835	2,581	3,201	606	224	13,447
3. Found infected ..	4,838	2,155	2,458	512	58	10,021
4. Given first treatment	4,319	1,898	2,253	471	56	8,997
5. Cured	3,185	1,597	1,910	362	56	7,110
Percentage infected cured ..	66%	74·1%	77·7%	70·7%	96·6%	71%
Percentage of treated cured ..	—	—	—	—	—	—
6. Removed from area (or dead)	626	69	136	16	2	849
7. Remaining in area uncured	1,027	489	412	134	—	2,062 (20·6%)
(a) Not located 0·3%	—	—	—	—	—	—
(b) Refused 12·2%	—	—	—	—	—	—
(c) Medical reasons 7%	—	—	—	—	—	—
(d) Under treatment 1%	—	—	—	—	—	—

In the monthly report of the Medical Officer in charge of ankylostomiasis operations* it is stated that examinations of immigrants showed only 7 per cent. of infected among 198 persons. These immigrants had been treated on the intensive method during their trip from Calcutta to Port of Spain. The results are in striking contrast to those found in immigrants by s.s. "Dewar" last year when 84 per cent. of 298 persons were found to be still infected on their arrival in the colony. The success of the present measures, if maintained, will remove an important source of infection to the colony.

Costa Rica (1916).†

The dispensary plan of campaign, commenced in September 1914, has been followed but this latterly has approximated to the intensive system wherever the topography and proximity of the homes would permit.

* Trinidad and Tobago, Council Paper No. 90 of 1916.

† Rockefeller Foundation. International Health Board. Third Annual Report. 1916. pp. 127–138.

In the earlier reports the figures given related to the number of specimens examined, not to the number of persons. These have now been revised to bring these reports into line with those of other areas.

Dispensary work.	During 1915.	During 1916.	Total to Dec., 1916.
Census..	44,593	46,114	90,707
Examined	30,297	40,579	70,876 (78·1%)
Found infected ..	19,401	22,608	42,009 (59·3%)
Given first treatment	18,816	22,037	40,853 (97·2%)
Cured	1,962	5,666	7,628 (18·7%)

Guatemala (1916).*

The work continued under the supervision of Dr. W. H. Rowan until June 28th when he was succeeded by Dr. A. M. Struse. Headquarters are in Guatemala city. In the latter part of the year an effort was made to put the work on a strictly intensive basis with Plantations as units of operation. Almost all are coffee estates, though sugar is raised on a few, and afford peculiarly favourable circumstances for effective work against the disease. The population is concentrated within small areas and considerable control can be exercised over the patients during their examination and treatment.

In the campaign about 9,218 of the 48,290 square miles of the country have been covered to date. More than four-fifths of this area lies in the plateau in the south, a short distance inland from the Pacific Coast. The labourers on the estates are mostly Indians and usually present severe clinical symptoms of the disease. During 1916 Plantations and towns with a census of 42,086 persons were dealt with. 39,596 or 94·1 per cent. were examined; 26,665 or 67·3 per cent. of those examined were found infected, 25,961 or 97·4 per cent. were given first treatment and 10,475 or 40·3 per cent. were cured.

The zone of heaviest infection lies in the departments of Retalhuleu, Suchitepequez and Escuintla on either side of the rail between Guatemala city and Ayutla. In Guatemala city the infection proved very light and was found to be largely confined to the poor and to inmates of the general hospital.

Sanitary Improvement: the installation of latrines on all Plantations and at all schools and residences and other buildings was made compulsory by presidential decree but the Department of Uncinariasis, which is a division of the National Board of Health, has preferred to exercise no authority and sought rather to stimulate interest in order to secure voluntary co-operation. Prior to the campaign only 576 latrines were in use among 70,176 persons. During the year 1916 1,646 new latrines were erected providing accommodation for 35,260

* *Loc. cit.* pp. 139–147.

persons and making a total to date of 2,694 new latrines with accommodation for about three-quarters of the population in the area under survey.

Nicaragua (1916).*

The Department of Uncinariasis continued throughout the year the work initiated under Dr. D. M. Molloy's supervision and confined its activities to the portion of the Pacific side extending from the Gulf of Fonseca to the north-western part of Lake Nicaragua. The inhabitants of this area subsist on agriculture and trade. They live mostly in towns of considerable size. Relatively few live permanently on the Plantations. Eighty per cent. of the population are Mestizos, i.e., persons of mixed Indian and European descent.

During the year practically no work was done on coffee or sugar Plantations. Headquarters were established in Managua. The method followed is the dispensary plan. The areas in which the campaign was pursued are not detailed in the report for 1916 but it is stated that the figures given include the examinations made at the central offices in Managua.

During the year 1916, 26,141 persons were examined. 16,518 or 63·2 per cent. were found infected and 15,473 or 93·7 per cent. of these were given first treatment. The number of " cured " is not stated.

Little progress was made in improving the sanitary condition during the year and this is attributable to the lack of general sanitary laws compelling the use of latrines.

Panama (1916).†

Dr. L. W. Hackett was director in charge of the campaign during the year. Since February 1916 activities have been confined to the section of the country lying west of the canal and south of the central mountain range. Here the population is dense and there is a heavy infection with hookworm. During 1916, 30,094 persons were examined. 24,193 (80·4 per cent.) were found infected and 23,747 or 98·2 received first treatment. Of 11,045 re-examined 49·9 per cent. were ascertained to be cured. These represent about 86 per cent. of the total population of the districts under survey.

In the city of Panama hookworm disease practically does not exist among the residents owing to thorough sanitation and the universal use of shoes.

Sanitary improvement is small owing to the absence of effective laws and the extreme difficulty of enlisting the voluntary co-operation of any considerable proportion of the inhabitants. In many parts of the country there are large areas of lowland in which latrines would become flooded. It is recognised that the basic problem in these sections is drainage rather than latrine construction.

Salvador (1916).‡

A department of Uncinariasis was organised as a bureau of the National Board of Health and commenced operations in March 1916.

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* *Loc. cit.* pp. 148–153.
† *Loc. cit.* pp. 154–161.
‡ *Loc. cit.* pp. 162–168.

Dr. C. A. Bailey assumed active charge in May and continued the campaign both on dispensary and intensive lines.

A town or estate is the unit and here the intensive method is applied. Where persons come to the Laboratory from outlying areas they are examined and treated after the dispensary method. The statistics however are not shown separately and for the present the work is classed as being of the dispensary type. The work has so far been confined to the department or State of San Salvador.

The following table shows the work completed up to December 31st, 1916. During the early months operations were confined entirely to the city of San Salvador. The percentage of infected is comparatively low as a large number of persons there were examined and found negative. There is a sewer system which largely prevents the spread of hookworm infection. The small number of persons cured is due to the removal of the military force, national guard and municipal police before re-examination could be made after treatment.

Dispensary Method.	Total for 1916.
1. Census	11,727
2. Examined	9,975 (85·1%)
3. Found infected	3,444 (34·5%)
4. Given first treatment	2,946
5. Cured	1,311
Percentage of infected cured 44·5 %	—
Percentage of treated cured	—
6. Removed from area (or dead)	502
7. Remaining in area uncured	1,133

Throughout the Republic are many coffee and sugar estates. On the former the conditions favour the spread of the infection but on the latter the infection is not so rife as the soil is less shaded and less moist. Very little progress in sanitation was made during the year.

Ceylon (1916).*

During 1916 active measures for the relief and control of hookworm disease were instituted in the Matale district under the supervision of Dr. H. H. Howard and later of Dr. W. P. Norris and Dr. J. E. Snodgrass. The selected area is situated in the central part of the island about seventy-five miles from Colombo and is seven by ten miles in extent. There are from forty to fifty towns, villages and hamlets and twenty-four rubber and tea estates included within its boundaries. The estate population numbers 8,000 and that of the villages 18,000 approximately.

Both intensive and dispensary plans of campaign have been followed. The intensive method was applied wherever possible but owing to

* *Loc. cit.* pp, 169–179.

obstacles, most of them of a religious nature, the dispensary method had to be substituted in the villages Alawatagoda and Wilane. Examination and treatment was provided on the dispensary plan in the central office at Matale and in the village Katugastota. The total number examined during the year was 7,645 of which 4,567 were treated under the intensive scheme and 3,078 under the dispensary scheme.

	Intensive Method 1916.	Estates.	Villages.	Total.
1.	Census	3,761	1,018	4,779
2.	Examined	3,697	870	4,567
3.	Found infected	3,647	846	4,493
4.	Given first treatment ..	3,568	533	4,101
5.	Cured	2,938	252	3,190
	Percentage of infected cured	—	—	71%
	Percentage of treated cured	—	—	77·8%
6.	Removed from area (or dead)	537	114	651 (14·5%)
7.	Remaining in area uncured..	—	—	652 (14·5%)
	(a) Refused.. .. 9·4%	—	—	—
	(b) Medical reasons 2·4%	—	—	—
	(c) Under treatment 2·7%	—	—	—

The following table gives a comparison of results by the intensive and dispensary methods :—

		Intensive.	Dispensary.
1	Census	4,779	—
2.	Examined	4,567 (95·6%)	3,078
3.	Found infected	4,493 (98·4%)	2,865 (93·1%)
4.	Given first treatment ..	4,101 (91·3%)	2,651 (92·5%)
5.	Cured	3,190 (77·8%)	441 (16·6%)

The intensive work was much more effective on the estates than in the villages. In addition to religious opposition, which leads the adherents of one faith to oppose participation with those of another in the same campaign, the villagers have a fixed belief that a purgative in wet weather is dangerous. In Ceylon this constituted a serious hindrance as a large proportion of the days are more or less rainy. A further difficulty lay in the movement of labourers. 537 (14·7 per cent.) infected labourers removed from the selected estates while the work was in progress.

None of the ten estates, on which work in 1916 was completed, was provided at the commencement of the campaign with latrines for their labourers. In the villages Alawatagoda and Wilane only nine latrines accommodated 274 homes. 184 additional homes were provided for during the campaign, leaving only 81 unaccounted for.

An existing Ordinance makes it compulsory for all estates to provide adequate latrine accommodation within one year, but the senior sanitary officer has no authority to supervise estate sanitation.

R. T. L.

Nozoe (M.). [**Method of making Fixed Preparations of Parasite Eggs.**] —*Taiwan Igakukai Zasshi.* (*Jl. Formosa Med. Soc.*) 1917. Apr. 28. No. 174. pp. 280–282.

[Based on Review by R. G. Mills.]

The eggs are first isolated by any familiar method or a portion of the faeces may be used without preliminary treatment. A couple of loops full of saturated salt solution are placed on a slide and a few of the eggs floated on this. A few loopfuls of 40 per cent. gelatine are then warmed in the flame to about 37° C. and mixed thoroughly with the eggs in the salt on the slides. The whole is then spread out thinly over the slide, care being taken not to injure the eggs. The gelatine is now hardened in an ice box or by an ether spray applied to the under surface of the slide. The slides are then placed in formalin for about 10 minutes and afterwards washed. The film is stained with Giemsa's stain or by azur-azur-eosin. The resulting preparation is uniformly purple with the contents of the eggs blue enclosed in purple shells.

In a second method the eggs are unstained, being mixed with a gelatine to which carbolic acid 0·5 per cent. has been added. The coverglass preparation is sealed by Canada balsam. Thus prepared the eggs keep in their natural condition for a long time.

R. T. L.

CHOLERA.

VON ROEMER (L.S.A.M.). **Over de Cholera te Batavia in 1915 en 1916.** [Cholera in Batavia during 1915 and 1916.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1917. Vol. 57. No. 2. pp. 295–308. With 10 charts & 7 maps.

A detailed statistical description of the cholera epidemics of 1915 and 1916 and to some extent of 1913 and 1914 as well. The facts of general interest are those relating to cholera inoculation and are shown in the following table :—

Year	Number inoculated	Number uninoculated	Percentage that acquired cholera	Case mortality percentage
1915	100,000	—	0·02	80
,,	—	59,504	0·58	86
1916	81,527	—	0·0098	87·3
,,	—	77,752	0·3	87·2

H. Schütze.

GUERRINI (Guido). **Endozooparassiti dell' intestino e colera. (Note statistiche.)** [Intestinal Parasites and Cholera.]—*Pathologica.* 1917. June 15. Vol. 9. No. 206. pp. 169–171.

The author examined some 641 people, dividing them up into groups and sub-groups according to their being military, civilian, prisoners-of-war or refugee patients (actual cases, carriers or convalescents). While 46·2 per cent. of the 195 carriers harboured parasites of one kind or another, and of 121 actual cases 30·6 per cent. and of 325 convalescents 28·7 per cent., it was seen that one particular parasite, *Trichocephalus trichiuris*, was present in 97·3 per cent. of those harbouring parasites when they were actual cases but in only 4·5 per cent. when they were carriers. The author does not think these figures fortuitous and deduces from them that the presence of intestinal parasites, particularly *Trichocephalus trichiuris*, predisposes to cholera. On the other hand another parasite, *Oxyuris vermicularis*, is present in 66·7 per cent. and 55·9 per cent. of infected cases when they are carriers and convalescents, though in only 18·9 per cent. when they are actual cholera cases, but the author does not comment on this.

H. S.

ROGERS (Leonard). **The Mortality from Post-Choleraic Uraemia: A 70 per cent Reduction through Intravenous Injections of Sodium Bicarbonate.**—*Lancet.* 1917. Nov. 17. pp. 745–746.

The decline in cholera mortality that the following table shows is,

as pointed out by the author, principally due to a decrease in deaths from uraemia :—

Total Cholera Mortality and the Deaths from Uraemia before and after the Use of Alkalies.

Without Alkalies.

Years.	Total cases.	Deaths.	Per cent.	Uraemia deaths.	Per cent.
1912 ..	170	54	31·76	24	14·11
1913 ..	200	49	24·5	17	8·5
1914 ..	222	49	22·01	25	11·2
1912–14..	592	152	25·6	66	11·1
		With Alkalies.			
1915 ..	226	39	17·22	6	2·64
1916 ..	204	52	25·5	8	3·92
1917 ..	154	24	15·6	5	3·2
1915–17..	584	115	19·7	19	3·25

The author's routine of treatment is as follows :—

In patients admitted early without prolonged suppression of urine the hypertonic solution (120 grains sodium chloride with 4 grains calcium chloride to 1 pint of sterile water) only is used at the first transfusion. If the case is sufficiently severe to require further injections, at each subsequent transfusion one pint of alkaline solution (60 grains of sodium chloride and 160 grains of sodium bicarbonate to the pint) is first given and followed by the hypertonic chloride solution in the quantity indicated by the specific gravity of the blood. In cases with suppression of urine the alkaline solution is given at the first injection as well. Moreover it is used in all cholera cases with deficient urinary secretion without much concentration of the blood as shown by the specific gravity. In addition, this solution is now used in the place of normal saline by the bowel.

H. S.

Arzt (Leopold). **Ueber Exantheme bei Cholera asiatica.** [Cholera Rash.] —*Wien. Klin. Woch.* 1917. July 19. Vol 30. No. 29. pp. 901–904.

Three old cases [this *Bulletin*, Vol. 6, p. 29] are recapitulated and a fourth new one added in which the rash was a brownish red, macular, confluent eruption occurring during convalescence on the lower chest, abdomen and inner side of the thigh. There was no ecchymosis or irritation.

The author considers a toxin, possibly the haemotoxin, as responsible.

H. S.

Takano (R.) & Yabe (S.). **[Sensitized Vaccine Treatment of Cholera.]** —*Saikin Gaku Zasshi.* (*Jl. Bacteriol.*). 1916. Nov. 20. No. 254. pp. 39–66.

[From Review by R. G. Mills.]

The authors report a slight loss of antigenic power as a result of the sensitization but the reaction following injection was greatly decreased.

H. S.

Greig (E. D. W.). **The Results of the Bacteriological Examination of the Stools of 659 Cases of Cholera at Calcutta.**—*Indian Jl. Med. Res.* 1917. Apr. Vol. 4. No. 4. pp. 651–657.

The following quotation is a summary of the work reviewed by the author and carried out during more than three years, thus including three epidemic periods.

"Total number of cholera cases in which the stools were examined bacteriologically, from November 1912 to January 1916 659

The results are :—

1. Cholera vibrio found in stools in	506	cases	= 76·75 %
2. Cholera-like vibrio found in stools in	51	,,	= 7·75 %
3. Cholera and cholera-like vibrios found in	30	,,	= 4·50 %
4. No vibrio found in the stools in	72	,,	= 11· 0 %

"Summary of bacteriological examination of stools of fatal cases in 659 total.

Total fatal cases examined from November 1912 to January 1916 132

The results are :—

1. Cholera vibrio found in stools in	112	cases	= 84·8%
2. Cholera-like vibrio found in stools in	1	,,	= 0·8%
3. Cholera and cholera-like vibrio found in	8	,,	= 6·1%
4. No vibrio found in stools in	11	,,	= 8·3%"

The negative cases were only finally reported after repeated examination. Dieudonné medium was used throughout. The cholera-like vibrios appeared to crop up mainly during the zenith and decline of an epidemic and only in the less severe cases ; it is not manifest whether they are to be regarded as pathogenic or not.

H. S.

Castellani (Aldo). **A Method to facilitate the Isolation of the Cholera Vibrio and other Organisms.**—*Brit. Med. Jl.* 1917. Oct. 13. pp. 476–477. *Jl. Trop. Med. & Hyg.* 1917. Dec. 1. Vol. 20. No. 23. pp. 272–273.

The idea at the back of this isolation method, which may be regarded as the inverse of Bandi's, is to agglutinate in the peptone water culture tube and as they grow, all organisms but the one to be isolated. For instance, the author's recipe for the isolation of cholera vibrios from a stool :—

"Inoculate peptone water tubes with the faecal matter . . . add to each tube : 3 to 5 drops polyvalent lactose fermenters faecal bacteria serum (*B. coli, B. pseudo-coli, B. coli tropi alis*, etc.) . . . 3 to 5 drops polyvalent non-lactose fermenter faecal bacteria serum (*B. proteus* group, etc. 3 to 5 drops paratyphoid B serum." In no case must the added sera contain coagglutinins for cholera to any extent. In the example quoted *B. coli, B. proteus*, etc., as they multiply are immediately agglutinated and sink to the bottom of the tube or at any rate form clumps which are speedily sedimented by centrifuging. The supernatant turbid in this case from the unhindered development

of *V. cholerae* can now be examined microscopically by agglutination with cholera serum and by plating on to suitable medium if any doubt exists.

The author admits however that "in practice things are not so easy . . . (1) The intestinal bacterial flora found in association with the cholera vibrio varies to a certain extent from country to country, from epidemic to epidemic, and even from individual to individual . . . (2) The preparation of powerful agglutinating serums against certain intestinal germs is far from easy. (3) Occasionally certain intestinal micro-organisms are at first inagglutinable by their homologous serums."

H. S.

DE RAADT (O. L. E.). **Ueber den diagnostischen Wert des Serumpeptonverfahrens bei der bakteriologischen Diagnose der Cholera.** [Cholera Diagnosis with Serum Peptone Water.] *Cent. f. Bakt.* 1. Abt. Orig. 1917. Aug. 30. Vol. 80. No. 1–3. pp. 12–15.

By means of a modification of BANDI's method of cholera diagnosis (inoculation of suspected material into peptone water containing specific cholera serum and agglutination of *V. cholerae* in statu nascendi) the errors of that method, viz., the difficulty of reading a result owing to a granular faeces, or one with a slimy deposit, or owing to the inhibition of growth when only very few cholera vibrios are present, are obviated, the modification consisting in preliminary enrichment in peptone water. The author considers it particularly suitable when the investigation is being carried out without laboratory conveniences, when unskilled persons are employed and when time is to be saved.

H. S.

BAUMGARTEN (Arnold) & LANGER-ZUCKERKANDL (Helene) **Ueber elektive Choleranährböden.** [Selective Cholera Media.] –*Ztschr. f. Hyg. u. Infektionskr.* 1917. May 3. Vol. 83. No. 3. pp. 389–406. With 5 charts.

The paper is in the main a criticism of SEIFFERT and BAMBERGER's chlorophyll cholera medium [this *Bulletin*, Vol. 8, p. 164]. The authors do not find it to be more selective than ARONSON's of which it is a modification.

Baumgarten and Langer-Zuckerkandl, using peptone water to which had been added dextrin, saccharose and decolourised fuchsin as contained in Aronson's medium [this *Bulletin*, Vol. 6, p. 495], claim to show that while haematoporphyrin encouraged the growth of *V. cholerae* [see Fig. 1] chlorophyll does not do so [see Fig. 5]. [It is patent however that the two experiments are not comparable in that one is carried out minus and the other plus alkali].

In Fig. 5 is also seen the inability of malachite green to suppress the growth of cholera, whereas many other organisms are inhibited by it in the same concentration.

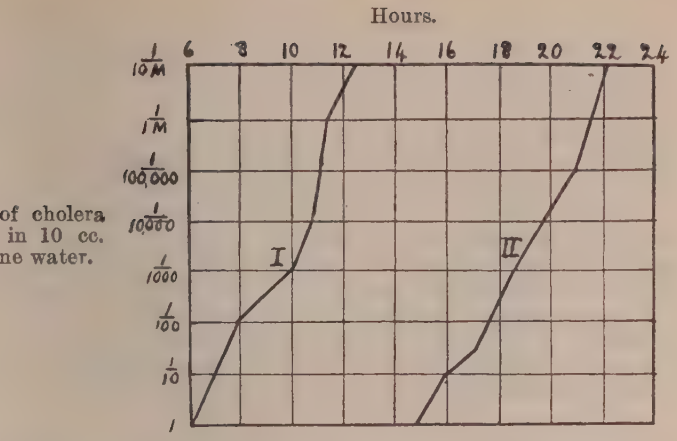

FIG. 1.

I. Peptone water + 2% of a 10% soda solution saturated with haematoporphyrin.
II. Peptone water + 2% of a 10% soda solution.

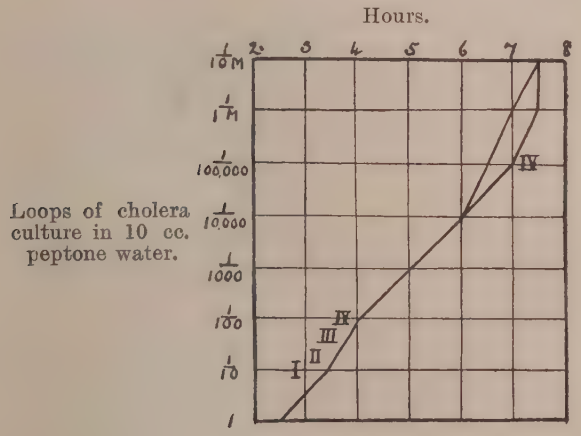

FIG. 5.

I. Peptone water.
II. ,, ,, + 2% chlorophyllin.
III. ,, ,, + 8% ,,
IV. ,, ,, + 0·4‰ malachite green.

The curves in the figures indicate the time at which the growth of *V. cholerae* has so far advanced as to recolour strongly the fuchsin contained in the peptone water, for various concentrations of cholera inoculation.

The authors therefore recommend Aronson's medium using a soda solution saturated with haematoporphyrin or haemin. Using artificial cholera stools they found that the growth of cholera colonies on their modification was more rapid than on the original Aronson.

H. S.

Greig (E. D. W.). **Bacteriological Studies of Cholera-Like Vibrios isolated from the Stools of Cholera Cases in Calcutta. I. Serological Investigations.**—*Indian Jl. Med. Res.* 1917. Apr. Vol. 4. No. 4. pp. 658–671.

Following on a serological investigation of cholera-like vibrios isolated from water [this *Bulletin*, Vol. 10, p. 84] the author examined some 70 cholera-like vibrios isolated from cholera stools and found (1) that none was able by rabbit-inoculation to occasion the production of agglutinins for the Koch vibrio, (2) that it was possible to classify all but 13 strains under 9 headings, one group having the large number of 30 members, and (3) that in the serum of patients harbouring these cholera-like vibrios, agglutinins for these strains were either not present or only in small amounts; this would however, in the author's opinion, not exclude the vibrios having some etiological relationship to the illness from which their hosts had been suffering.

H. S.

Murillo (F.) & Mouriz (J.). **La determinación especifica de las bacterias y, en particular, de los vibriones del cólera y los vibriones del Tor.** [The Specific Differentiation of Bacteria and, in Particular, that of Cholera and El Tor Vibrios.]—*Bol. Inst. Nac. Higiene de Alfonso XIII.* 1917. Mar. 31 & June 30. Vol. 13. Nos. 49, 50. pp. 1–8; 105–115.

By means of a complement deviation test, carried out on the usual lines, the authors find that the cholera and El Tor vibrios should be ranked as distinct species, although by other tests, such as agglutination, they would be regarded as identical. The opinions of authors, such as Crendiropoulo, who have recently studied the question are passed in review.

J. B. Nias.

Feldmann (Ignatz). **Ueber choleraähnliche Vibrionen mit besonderer Berücksichtigung ihrer Mutationsvorgänge.** [Cholera-Like Vibrios and Mutation.]—*Cent. f. Bakt.* 1. Abt. Orig. 1917. Nov. 15. Vol. 80. No. 4. pp. 129–160.

A very detailed description of 10 strains isolated in Gyula [Hungary] in 1913, 1915 and 1916. The author found that three and three only of his strains reacted similarly in the agglutinating test, crossing them all with their various specific sera, and as these corresponded in all other ways with one another, he concluded that the agglutination test was a reliable one for differentiating purposes. [As, however, these three strains were obtained one from the mixed faeces and the two others from the segregated faeces of a single family, there is no reason to look upon the three series of tests (cultural, serological, etc.), as anything else than a double repetition, the same strain being used throughout.] The complement fixation tests carried out with the 10 strains covered exactly those of agglutination.

Following the methods of Baerthlein (plating an 8 day broth culture on to agar) and Bail (plating a saline emulsion of the vibrio kept at 37° C. for 8 days) the author attempted to differentiate cholera-like vibrios from the Koch vibrio and from one another by the mutation forms that resulted, but it was impossible to do so, the vibrios mutating similarly in all cases.

H. S.

Nicholls (Lucius). **The Chemical Affinities of *Vibrio cholerae*.** — *Lancet.* 1917. Oct. 13. pp. 563–566.

A paper giving a number of charts which compare the susceptibility of *V. cholerae* with that of certain other organisms to alkalis, acids, salts and aniline dyes. The well-known tolerance towards alkalis and intolerance towards acids of the Koch bacillus is demonstrated. The following medium is recommended for the isolation of cholera vibrios when present in small numbers.

To 3 litres of unboiled tap water add 1·2 gm. calcium oxide and 30 gm. Witte peptone. No comparative tests are recorded, but a successful isolation is described; an almost pure cholera pellicle was obtained in two days when to 3 litres of the above medium were added 50 gms. of normal stool, *B. coli* and *B. acidi lactici* and as small a quantity of *V. cholerae* as 1 cc. of a 1 : 100,000 dilution of a 24-hours-old (presumably peptone water) culture.

Another method, which is outlined, is to add to three 5 cc. samples of stool normal caustic soda solution until the tubes contain 3·2, 3·5 and 3·75 per cent. of that alkali; after one hour the contents are emptied into peptone water flasks and inoculated; here destruction of many non-cholera organisms by the alkali renders isolation of *V. cholerae* more easy.

The author recommends the addition of calcium carbonate as an antacid to stools which have to stand some time before examination in order to prevent the destruction of cholera vibrios by acids formed during fermentation of the stool.

H. S.

Crowell (B. C.) & Johnston (John A.). **Bacteriologic Investigation of Faeces and Bile of Cholera Cases and Cholera Carriers.** — *Philippine Jl. Sci.* Sec. B. Trop. Med. 1917. Mar. Vol. 12. No. 2. pp. 85–103.

An interesting paper which discusses and gives a good bibliography for a number of points in relation to cholera, including carriers, the corporeal route of infection, the presence of vibrios in the gall bladder, the significance of cholera-like vibrios. "In 212 cases of cholera [which they investigated] the vibrio was found in the bile in 65·2 per cent. and only in the bile in 5·7 per cent. In 32 cholera carriers detected after death, the cholera vibrio was found in the bile in 75 per cent. and only in the bile in 43·7 per cent."

Some 30 vibrio strains, morphologically and culturally like the Koch bacillus, recovered from the faeces and gall bladder of cholera patients, cholera carriers and others, which on isolation were agglutinatively negative with $\frac{1}{500}$ of a 1 : 6,000 cholera serum, were grown on ox bile and agar alternately; after 40 transfers 8 (6 from cholera patients and 2 from carriers) agglutinated with $\frac{1}{500}$ microscopically, with $\frac{1}{4000}$ macroscopically [sic] of apparently the same titred serum. Of these 8 strains, 3 lost the agglutinating property again after 2 months and the other 5 agglutinated less promptly. Even when in good agglutinating condition, these 8 strains were not capable of producing serum which would agglutinate the true cholera vibrio.

H. S.

Schoebl (Otto) & Panganiban (C. S.). **Experimental Cholera Carriers and Immunity.**—*Philippine Jl. Sci.* Sec. B. Trop. Med. 1917. Mar. Vol. 12. No. 2. pp. 43–49.

Guinea-pigs and rabbits infected with cholera vibrios intravesicularly were found to develop agglutinins for that organism; agglutinins were also present in the gall of such animals, though absent when the animal had only received intravenous inoculation of killed vibrios. It could not be shown that inoculation was a prophylactic against the induction of the carrier state by intravesicular injection of living vibrios (16 guinea-pigs); this, as the author himself points out, is a very severe test, seeing that the animals received but one inoculation and that large numbers of vibrios were injected into the gall bladder.

Inoculation with cholera vaccine following on infection of the gall bladders did not reduce the carrier period (9 guinea-pigs).

H. S.

Schoebl (Otto). **The Influence of Bile upon the Distribution of Cholera Vibrios in the Digestive System of Experimental Cholera Carriers.**—*Philippine Jl. Sci.* Sec. B. Trop. Med. 1917. Jan. Vol. 12. No. 1. pp. 23–24.

A paper on very similar lines to one already published by the author [this *Bulletin*, Vol. 10, p. 83]. Guinea-pigs infected with *V. cholerae* by gall bladder inoculation were killed from 8–12 days afterwards and the Koch bacillus sought in various parts of the alimentary tract. In the six cases where ox bile had been fed to the animals, vibrios were found in every case in the gall bladder, duodenum, ileum, caecum and faeces, while in the five animals that received no bile, vibrios were absent three times from the faeces, twice from the caecum and once from the duodenum and when present, were generally there in smaller numbers than when ox bile had been ingested.

H. S.

Bail (Oskar). **Untersuchungen über Vibrionenvergiftung.** [Researches on Vibrio Toxins.]—*Ztschr. f. Immunitätsf. u. Exper. Therap.* 1917. July 25. Vol. 26. No. 4. pp. 330–367.

A long paper, thickly sown with experiments, which is best read in its entirety and of which the following is a summary.

Inoculation with a watery extract of *V. kadikjöji* produces an antitoxic serum which acts according to the law of multiples. The antitoxic action is removed by vibrios themselves only when these are equal in amount to that quantity of vibrios which would give enough (watery extract) toxin to produce the same neutralising effect.

An inverted Danysz phenomenon is observable in that an amount of toxin which is capable of just neutralising a certain quantity of anti-toxin, is not able to do this if the toxin is added by degrees and not all at one time.

Antitoxic serum can only protect against a bare lethal dose of living vibrios and when multiplication is rendered impossible by the addition of bactericidal serum. The toxin obtained from *V. kadikjöji* cannot, therefore, be regarded as the true endotoxin.

Normal serum from a variety of animals is capable, when used in large quantities, of neutralising endotoxin. Heating, ageing and absorption by any kind of microorganism removes this power from normal serum, which would indicate that complement is the active body concerned.

If serum is added when extracting *V. kadikjöji* very little toxin is obtainable and as this occurs whether the serum is active or not, it cannot be due to a neutralisation of the toxin.

H. S.

Krediet (G. J.) **Choleravaccinatie te Batavia in 1914.** [Cholera Inoculation in Batavia.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1917. Vol. 57. No. 2. pp. 253–259. With 6 charts.

After an apparently ineffectual inoculation campaign in 1911, a second attempt at the curtailment of a cholera epidemic by inoculation on a large scale was made in 1914.

The epidemic began gradually on the 8th September; inoculation was commenced on October 1st and carried through in a short time, on 90 per cent. of the population in the district Batavia, on 50 per cent. in the district Weltevreden. From October 10th in Batavia and from October 20th in Weltevreden a big decline in the occurrence of fresh cases was observed; as, however, there was no control population [the author does not state what happened to the uninoculated half of the Weltevreden population and why they could not have served as controls] one could not be sure of the inoculation being the cause of this decline. Nevertheless the author considers that a beneficial effect may be inferred from the following points:—

(1) A marked fall in the number of cases so early in the epidemic is unusual in Batavia.

(2) This fall occurred first in the Batavia district where 90 per cent. of the population had been inoculated, in spite of the fact that the locality is a notoriously unhygienic one, and only subsequently in the Weltevreden district where but 50 per cent. were inoculated.

(3) There was no recurrence of cholera for six months, when the immunity produced might be regarded as on the wane.

The 1915 epidemic was also quickly suppressed by an inoculation campaign embracing 85 per cent. of the population.

H. S.

Castelli (Agostino). **Osservazioni e ricerche sulla vaccinazione anticolerica. Nota.** [Cholera Inoculation.]—*Sperimentale.* 1917. Oct. 15. Vol. 71. No. 4. pp. 249–264.

Comparing the more usual bacterial vaccine with Lustig and Galeotti's nucleo-protein one, the author points out a variety of reasons for preferring the latter. The substance inoculated is more homogeneous and pure, is more quickly absorbed and can be kept in the dry state; dosage is more easily regulated.

The original work reported in the paper consists of researches into the differences resulting from the inoculation of 90 men, half with a nucleo-protein vaccine (1 cc. subcutaneously on two occasions with 7 days interval) and half with a bacterial vaccine (2,000 million followed by 4,000 million 7 days later).

The local reactions were in both groups negligible; a general reaction (headache, temperature and diarrhoea) occurred among the nucleo-protein group in 22 per cent. after the first and in 24 per cent. after the second inoculation, while among those receiving the bacterial vaccine, a general reaction was observable in 37 and 64 per cent. respectively.

The men's sera were examined for agglutinins and bacteriolysins 20, 30, 40 and 60 days after inoculation. While those inoculated with nucleo-protein vaccine produced no agglutinins, the other group gave titres ranging from $\frac{1}{25}$–$\frac{1}{250}$, the maximum being reached about 30 days after inoculation. Bacteriolysins were present in both groups about equally, titres between $\frac{1}{25}$ and $\frac{1}{500}$ being found.

H. S.

WEBER (R.). **Experimentelle Untersuchungen zur Frage der Schutzimpfung gegen Typhus und Cholera.** [Typhoid and Cholera Inoculations.]—*Ztschr. f. Hyg. u. Infektionskr.* 1916. Nov. 23. Vol. 82. No. 3. pp. 351–404.

In experiments in which guinea-pigs were immunised and subsequently tested for immunity by lethal injections of living vibrios, similarly prepared cholera vaccines, up to one year in age, did not differ in antigenic power, except in those cases where a granular substance had separated out and floating on the surface of the vaccine could not be re-emulsified by shaking.

Inoculation with cholera vaccine alone or with a mixed vaccine of typhoid and cholera would seem to produce the same degree of cholera immunity in guinea-pigs as tested with a lethal inoculation and in human beings as tested serologically (agglutination and Pfeiffer's test); in fact there is apparently an additional stimulus to the production of antibodies for the vibrio in the presence of another organism in the vaccine, although the local and general reactions were not more pronounced when a mixed vaccine was inoculated.

A very noteworthy fact indicated by the paper is the strongly marked individuality of response to inoculation exhibited by animals. Even batches of as many as twenty animals may give misleading results.

H. S.

JIMURA (Y.). [**Disinfection of Fresh Fish with Solutions of Dilute Hydrochloric Acid as a Prophylactic against Cholera.**]—*Saikin Gaku Zasshi.* (*Jl. Bacteriol.*). 1916. Nov. 20. No. 254. pp. 67–75

[From Review by R. G. MILLS.]

During the recent cholera epidemic in Japan public attention was called to the danger of eating fresh fish exposed in the markets for sale, on the grounds that they might have come from an infected part of the sea. Some of these fish are eaten raw; hence the demand for some form of disinfection that would permit the practice under these conditions. Solution of HCl 1/30 per cent. was used and was found insufficient because of its lack of penetration. This was somewhat increased by the addition of salt to the amount of 3 per cent. but was considered unsafe for general use. 1/10 per cent. salicylic acid was also tried with no better success.

H. S.

TYPHUS.

i. Robertson (Muriel). **Recent Researches into the Aetiology of Typhus.** (Discussion.)—*Proc. Roy. Soc. Med.* (Sect. of Epidem. & State Med.) 1917. June. Vol. 10. No. 8. pp. 95–118.

ii. Foulerton (Alexander G.R.). **On Typhus Fever.**—*Jl. Roy. Army Med. Corps.* 1917. Aug. Vol. 29. No. 2. pp. 224–228.

Miss Robertson, in the above paper, gives an excellent summary of most of the recent experimental work which has been carried out in regard to the aetiology of typhus fever.

Dr. Brownlee, who took part in the subsequent discussion, stated that, in his experience, typhus fever was "a disease with almost no complications" and that such as do occur are due either to neglect or want of proper nursing care. He also stated that race plays an important part in susceptibility to this disease, and instanced the Irish in Glasgow and London as demonstrating the considerable variation of immunity which may exist. The epidemiological evidence appeared to him to afford conclusive proof of the transmission of the disease by vermin.

Lieutenant-Colonel E. W. Goodall gave an instance, from his own experience, which led him to believe that transmission of the disease may occasionally be brought about by other means than lice.

Major A. G. R. Foulerton suggested that the relative frequency of double-infection [i.e., the occurrence of typhus fever with another infectious disease] is an explanation, "in part, of the variety of parasites described as having been obtained by bacteriological examination of the blood from cases of typhus fever."

Major Foulerton quoted Professor Jürgens as describing an experiment, carried out in Germany, in which twenty healthy men were closely confined with twenty men suffering from typhus fever who had been freed from lice, without any spread of the infection. He also quoted the case, recorded by Nicolle, of the warder in a colonial prison who maliciously transferred lice from a prisoner with typhus fever to two healthy individuals, both of whom became infected. All the evidence, he considered, went to prove that the louse is the carrier of the typhus fever virus, and "probably the only carrier."

Referring to the Plotz-Baehr-Olitsky bacillus, Major Foulerton did not consider that it appeared to have any causative relationship with typhus infection. He, however, considered that it was highly probable that the *Rickettsia prowazeki* organism represents a phase in the evolution of the typhus virus. He referred to Rocha-Lima's work in which it was shown that Rickettsia first appears in the intestinal epithelial cells of the louse on the fourth or fifth day after feeding on an infected patient and in which it appeared that full development is not reached until the eighth or ninth day. "In other words, the virus of typhus fever, after it has attained full activity in man, must pass through a phase of evolution in the louse before it can be transmitted to a fresh human case." Major Foulerton also quoted Nicolle as stating that "the louse cannot transmit the virus until seven days after an infected meal, and does not transmit it after the tenth day." He considers that if Rickettsia represents a phase in the evolution

of the virus of typhus fever, it is probable that the infecting parasite is a protozoon.

"It is obvious," he concluded, "that a quarantine of at least twenty-one days is necessary after the last man in an infected unit has been freed from lice—allowing from seven to ten days for the evolution of the virus in the louse, and from six to ten days for the incubation of the virus in man. And even twenty-one days' quarantine from the date of the last case of typhus fever does not cover every possibility. There is the possibility, suggested by a single positive experimental result, of the transmission of the virus from an infected female louse to the ova."

Dr. A. Bacot suggested that, in view of the secretive habits and long life apart from the host of *Cimex lectularius*, this insect would, "supposing it to be implicated," afford a ready explanation for the occasional gaps between primary and subsequent cases.

Dr. Howard Barrie, as the result of considerable experience of typhus fever in Serbia, considered that there could be no doubt that the body louse is the principal offender. He did not suspect either the flea or bed-bug, and is not convinced that the head-louse is a carrier. He stated that ambulant cases in his experience were not uncommon.

R. P. Cockin.

Starkenstein (E.). **Fleckfieberstudien.**—*Wien. Klin. Woch.* 1917. Feb. 1. Vol. 30. No. 5. pp. 127–136. With 16 charts.

In this paper Starkenstein gives an account of the epidemic of typhus fever which occurred in Russian Poland during the first year of the German occupation. His remarks refer chiefly to the town of Radom, at which place he witnessed the outbreak and was present throughout its whole course.

A statistical table is given showing the racial incidence and death-rate of the disease, and a striking feature displayed by this table is the small number of cases which are shown to have occurred amongst the occupying troops. Only six of these contracted the disease, as against 1,328 of the civilian population. Of this latter total 1,166 were Jews—i.e., 87·7 per cent. This incidence among the Jews represents nearly 6 per cent. of the total Jewish population of Radom. Other nationalities suffered to the extent of 0·6 per cent. During the first year of the German occupation of Radom, 3 per cent. of the civilian population died. The death-rate among the Jews was lower than in the other races and the author considers that the vermin-infested dwellings and insanitary surroundings in which they live have conferred upon the Jewish community a certain degree of immunity which is not shared by the remainder of the population. Starkenstein states that "in the houses where one finds lice one also finds typhus."

The course followed by the epidemic was, more or less, normal and the cases increased as the winter set in. With the return of summer, the cases decreased in number. The death-rate however was complicated by tuberculosis in the winter cases and typhoid fever in the summer ones. In the summer the typhus death-rate undoubtedly rose owing to this latter complication and Starkenstein states that whereas in the winter months 6–7 per cent. of typhus cases died, in the summer typhus cases complicated with typhoid had a death-rate of nearly 50 per cent. Starkenstein states that a general survey of

the epidemic does not support the generally accepted view that an epidemic becomes milder towards its termination. He found the infection as virulent in the later cases as in the earliest.

The author gives an interesting account of a small epidemic occurring in a community of 160 civilian labourers in which, after the sequestration of 18 typhus cases, the remainder were de-loused and placed in clean quarters. Subsequently three further cases, which were apparently already infected, occurred. There were no further cases, although the men slept together and again became verminous. Starkenstein questions whether this is proof that no contagion exists during the incubation period. He considers that if cases and contacts are thoroughly freed from lice and kept free, there is no necessity for isolation. The knowledge that lice can only be infected from typhus cases during the fever and that infection of the louse does not take place during the incubation and convalescent periods considerably simplifies the question of quarantine.

With reference to diagnosis, Starkenstein states that he considers the " Weil-Felix " reaction to be " absolutely specific in typhus fever," and he found that the reaction failed in none of his cases. As to treatment, he is completely in agreement with those workers who consider the silver colloids as most effective in lowering the temperature and cutting short the course of this disease. He, however, warns other workers as to their injurious and secondary effects, and states that he had observed extensive bleeding from the mouth, stomach and other mucous surfaces and nervous symptoms, after their administration. He recommends that collargol should be given intravenously, in 10 cc. doses of a 2–4 per cent. solution, and repeated daily for several days, in combination with calcium chloride and atophan āā 0·5 gm. and quinine hydrochlor. 0·2 gm.

R. P. C.

Hicks (John R.). **The Modern Hygiene of Typhus Fever—Its Application at the Port of New York.**—*Amer. Jl. Pub. Health.* 1917. July. Vol. 7. No. 7. pp. 628–630.

Hicks regards ordinary " kerosene " as the cheapest and most efficient vermicide ; and the following routine procedure, adopted for the disinfection of typhus contacts at the Port of New York, is based upon this fact.

Upon arrival the immigrant contacts are made to march in line to a concrete court, where each one is given an open-mesh cotton bag into which all clothes from valises or trunks are placed. The valises, trunks, shoes, hats, etc., are then transferred to a large sulphur chamber to be disinfected over night. [Eight pounds of sulphur to 1,000 cu. ft.]. The mesh bag and its contents are then taken by the immigrants to a large room, where the latter are lined up and undressed. Their clothes are put into these bags and a metal tag, bearing a distinctive number, is attached. A rubber tag, bearing the same number, is placed round the neck of the owner. Money and other valuables are taken away, and, after being dipped in a solution of 50 per cent. alcohol, placed in an envelope bearing the owner's number. After being stripped the immigrants pass from this room into the shower bath room, where they are given a preliminary bath—using soft soap and

hot water. They are then given a petroleum bath, about six ounces per patient being used to destroy all vermin. After this bath, they are dried and given pyjamas and slippers and then fed. Clothes are disinfected by steam under pressure, dried " in vacuo " and returned to the owner. After dressing the immigrants are removed to a clean dormitory.

The inefficacy of sulphur dioxide as a vermicide in the case of pediculi is illustrated by an experiment in which these parasites were exposed to the fumes of this gas [9 pounds to 200 cu. ft.] for 15 hours, at the end of which the pediculi were still alive.

R. P. C.

Cumming (James G.) & Senftner (H. F.). **The Prevention of Endemic Typhus in California.**—*Jl. Amer. Med. Assoc.* 1917. July 14. Vol. 69. No. 2. pp. 98–102. With 2 text-figs.

After a long immunity from typhus fever, there occurred in California, in the summer of 1916, 24 cases—five of which were secondary. The outbreak synchronised with the large influx of Mexican labourers, resulting from the disturbed state of that country. As the case incidence grew from 9 cases during June, July and August to 15 in September, the authorities commenced active measures to prevent its further entry and to stamp out the epidemic. The railway companies co-operated in these measures and established observation camps to which all incoming labourers were sent upon their arrival in the country. They were isolated in these camps for 15 days, thoroughly cleansed and freed from lice and all their belongings disinfected. Strict supervision of the hygienic conditions of the labourers at the section camps was carried out under the supervision of the foremen, who were overlooked by state inspectors.

The result of these energetic measures soon became apparent and the number of cases from October 1 1916 to March 1, 1917 fell to seven, one of which was a secondary case. Of these seven cases, five occurred in October 1916. The remaining two cases were not railway employees. No cases of typhus fever have been reported in California since January 4, 1917 and no cases have occurred amongst railway employees in the railroad camps, since October 25, 1916.

With regard to louse infestation, it was found that, at the beginning of October, 1916, 35 per cent. of the immigrant labourers harboured *Pediculus vestimenti* and 60 per cent. *Pediculus capitis.* At this period measures to free the labourers from lice were instituted and when examined in March 1917, no body lice were observed and only one per cent. were infested with *Pediculus capitis*—thus showing that the measures taken had been effective.

The death-rate was 9·7 per cent.—3 out of 31 cases. Experimental inoculation was carried out with guinea-pigs with the blood of 8 cases. In 5 of these the blood was withdrawn after the crisis and was negative. Three of the animals developed a fever of several days' duration, after an incubation period of 10–12 days. All the strains isolated were carried on to the fourth generation. The authors state that " we have observed that typhus fever produces no distinct pathologic condition in guinea-pigs, such as is found in Rocky Mountain spotted fever."

R. P. C.

Olitsky (Peter K.), Denzer (Bernard S.) & Husk (Carlos E.). **The Etiology of Typhus exanthematicus in Mexico (Tabardillo).**—*Jl. Infect. Dis.* 1916. Dec. Vol. 19. No. 6. pp. 811–831. With 5 charts.

The authors state that they have been able to establish the identity of the organism of Mexican typhus fever with that of *B. typhi exanthematici.* The proofs rest on the appearance of the colonies, morphology of the bacillus, cultural characterisitcs, fermentation reactions and the agglutination of the organism isolated by typhus immune serum. The work was carried out at Matehuala, Central Mexico, during the epidemic of the winter months of 1915–16, and owing to the disturbed state of the country was attended with very great difficulty. The epidemic was of moderate severity and of the authors' cases 20 per cent. died. [It was whilst engaged on this work that Dr. Husk succumbed to the disease.]

R. P. C.

Redewell (Francis H.). **Typhus Fever.**—*Southwestern Med.*—1917. May. Vol. 1. No. 5. pp. 31–39.

A paper read before the Maricopa Medical Society, Arizona, which gives a summary of some of the recent work on typhus fever. The writer is not convinced that artificial immunity can be produced and considers that infection with the comparatively mild "Brill's disease" affords the best protection against the more virulent form of typhus.

R. P. C.

Mitchell (J. Alexander). i. **Typhus Fever ("Black Fever" or "Mbetalala") in the Cape Province.**—*Med. Jl. S. Africa.* 1917. July. Vol. 12. No. 12. pp. 189–192. *S. African Med. Rec.* 1917. Sept. 8. Vol. 15. No. 17. pp. 259–262.

ii. **Address on Typhus Fever.**—*S. African Med. Rec.* 1917. Aug. 25. Vol. 15. No. 16. pp. 244–248.

Dr. Mitchell states that, for a number of years past, there have been outbreaks of an infectious fever of anomalous type in the Transkei and Border districts of the Cape Province. The attention of the Public Health Department was first called to it during the outbreaks occurring in the Victoria East, Stuttenheim and Kingwilliamstown districts in 1900, but there is evidence that the disease has existed since 1886, and possibly earlier. In this outbreak [of 1900] the disease was at first thought to be plague but was afterwards recognised as the disease known amongst the natives as "Black Fever." The similarity of this disease to typhus fever had long been recognised, but in the nearly invariable absence of the exanthem the diagnosis of typhus was not made.

Since March, 1916, considerable outbreaks of the disease have occurred in the Glen Grey, Queenstown and Kingwilliamstown districts and it has been possible to accommodate a number of patients, both white and coloured, in hospitals where they could be carefully and continuously observed.

The disease follows the typical course of typhus fever "from first to last"—a considerable proportion of the cases showing the typical exanthem.

The author considers that the disease in the later outbreaks is more virulent than in the past, and advises that every means should be used to prevent its spread and eventually to stamp it out. The measures should include the education of the native as to the seriousness of the situation and the necessity which exists for personal cleanliness and hygienic surroundings. Whilst considering lice as the most important transmitting agents of the disease in the Cape Province outbreaks, Dr. Mitchell states that "there are certain facts which go to show that the disease may be conveyed otherwise than by biting insects." He considers that "vermin, dirt and overcrowding are the all-important factors of spread and persistence of typhus."

[Dr. Rees, Port Health Officer and District Surgeon of Port Elizabeth, died of typhus fever whilst investigating the last epidemic.]

R. P. C.

Cox (F. E.). **A Review of Recent Literature on Typhus Fever and Acute Anterior Poliomyelitis.**—*Commonwealth of Australia Quarantine Service.* Publication No. 13. 79 pp. With 2 coloured plates & 1 map. 1917. Melbourne: Albert J. Mullet, Government Printers.

In this publication Dr. Cox has succeeded in collecting and epitomizing all the recent information regarding these two diseases in a serviceable form. As both typhus fever and acute anterior poliomyelitis are unknown in Australia an effort is being made by Dr. Cox through the officers of the Quarantine Service to prevent their entry. The various measures which have been found effective in combating the disease in typhus infested areas are detailed at length and the measures most suitable for personal, municipal and trench use are given. A map giving the distribution of typhus fever in 1915, and two plates—one of which shows a characteristic typhus rash, the other the typical typhoid rash for comparison—illustrate that portion of the publication which deals with typhus fever.

R. P. C.

Blanc (Jacques). **Contribution à l'étude clinique du typhus exanthématique. Sa prophylaxie dans la guerre actuelle.** *Ann. d'Hyg. Pub. et de Méd. Légale.* 1917. Jan. 4 Ser. Vol. 27. pp. 5–28. With 2 charts.

A detailed clinical account of typhus fever in which special attention is given to differential diagnosis, treatment and prophylaxis. With reference to the latter the author recommends the establishment of segregation camps behind the Allied lines, in which all German prisoners should be confined for observation for a period of twelve days. As to treatment, the author states that he has found electrargol and collargol of considerable use in combating the fever; and he recommends camphorated oil, in 5–10 cc. doses daily, as a cardiac stimulant. Spartein and adrenalin were also found to be of value in this latter connection.

R. P. C.

Wiener. **Zur Epidemiologie und Prophylaxe des Fleckfiebers.**—*Wien. Klin. Woch.* 1917. Feb. 1. Vol. 30. No. 5. pp. 144–145.

Wiener describes, in this article, the general sanitary measures taken to ensure the health of the prisoners' camp at Kenyermézo and especially to guard against an outbreak of typhus fever. These are stated to have been successful until 303 Serbian prisoners arrived in a state of extreme wretchedness, many of them being sick. Most of these prisoners were suffering with dysentery, some had typhoid fever and others undoubtedly had typhus.

About a month after their arrival the author recognised four cases of undoubted typhus fever, which confirmed the suspicions he had previously formed from post-mortem findings on other cases. The author noted the incubation period of this disease to be about 14 days, though he considers it inconstant and liable to considerable variation.

R. P. C.

i. Wiener (Emerich). **Beitrag zur Fleckfieberdiagnose. Eine vorläufige Mitteilung über die Farbenreaktion des Harnes.** [Typhus Diagnosis. The Colour Reaction of the Urine.]—*Münch. Med. Woch.* 1917. May 22. Vol. 64. No. 21. p. 696.

ii. Synwoldt (Jna). **Zur Kritik der Farbenreaktion des Harns als Fleckfieberdiagnostikum. (Bemerkung zur Arbeit von Emerich Wiener,** *Münch. med. Wsch.* 1917).—*Ibid.* Aug. 7. No. 32. pp. 1059–1060.

i. In the first of these papers, Wiener states that, when normal urine is shaken up with ether, an intense blue colour results upon the addition of Jenner stain to which a 1 per 1,000 permanganate solution has been previously added. An intense green colour results when urine from typhus fever patients is used in the reaction. He describes his procedure as follows :—

(1) 4 cc. of urine is mixed with an equal quantity of ether and shaken once or twice. To this mixture is added :—(2) 2 cc. of distilled water, 3 drops of Jenner stain and 10 drops of 1 per 1,000 permanganate solution after thoroughly mixing. The resulting colour is as described above. The author has succeeded in demonstrating the reaction in eight cases of typhus fever and has controlled the test on the urines of 35 cases —19 of which were normal and 16 of which were suffering from diseases other than typhus.

ii. Synwoldt has been able to obtain positive results with the above reaction in cases of typhoid fever, phthisis, tubercular glands, measles, scarlet fever, pernicious anaemia, nephritis and also in healthy persons. He is therefore of opinion that the reaction is not specific for typhus fever and of no diagnostic value in that disease. (Synwoldt had no typhus fever patients).

R. P. C.

Weil (E.) & Soucek (A.). **Die zerebralen Erscheinungen und die meningeale Permeabilität bei Fleckfieber.** [Cerebral Symptoms and Permeability of the Meninges in Typhus.]—*Deut. Med. Woch.* 1917. July 26. Vol. 43. No. 30. pp. 931–933.

Weil and Soucek find that in all cases of typhus fever, subsequent to

the fall of the fever, a high degree of meningeal permeability exists. The fact that the condition exists in mild cases of the disease proves, in the opinion of the authors, that this characteristic is as constant a feature of the disease as is the exanthem. The authors are not clear as to whether the condition is a result of a true meningitis or is due to some alteration in, or damage to, the meningeal vessels. Fuchs is quoted as stating that in cases of typhus fever which exhibit marked nervous symptoms the cerebrospinal fluid gives a positive Weil-Felix reaction.

R. P. C.

Schiff (Friedrich). **Das Blutbild bei Fleckfieber und seine praktische Bedeutung.** [The Blood Picture in Typhus.]—*Deut. Med. Woch.* 1917. Sept. 20 & 27. Vol. 43. Nos. 38, 39. pp. 1193–1195; 1229–1230. With 9 charts.

In these papers Schiff describes the blood changes which he observed in his examination of a series of typhus fever patients. About sixty cases of the disease were under observation and, of these, thirty were examined daily. The changes are described as typical and chiefly involved the leucocytes.

In the first days of the disease the total leucocyte count is diminished —the other constituents remain normal. From this period onwards the leucocytes increase from day to day, and Schiff considers this as an indication that inflammatory changes are taking place in the bone marrow and lymphoid tissues. At the end of the first week the leucocyte count is markedly increased and this increase is chiefly due to the invasion of the blood by young neutrophile forms, with rod-shaped nuclei, which account for 50–60 per cent. of the total count. At this period, eosinophiles disappear from the blood. At the end of the first week all typhus cases have exactly the same blood picture.

During the second week of the illness the leucocytes increase still more, the increase being caused by a considerable addition of large mononuclears and the appearance of inflammatory plasma cells and other atypical forms. The neutrophile forms, described above, undergo a considerable decrease and at this period are but 30–20 per cent. of the total count. At this stage the differences between the various cases are great. Schiff divides the cases into two types :— (a) Those showing marked leucocytosis with a relative neutropenia, increase of large mononuclears and the atypical forms. (b) Those with a moderate leucocytosis and having a slight or no increase of large mononuclears.

The first of these types was fairly abundantly represented in the author's cases—but transition types were also observed. In the later days of the disease, the blood picture gradually approaches the normal and eosinophiles re-appear. The condition always disappears after the illness.

Schiff considers that the blood picture in conjunction with the clinical symptoms is of great diagnostic value, especially so before the appearance of the exanthem.

R. P. C.

Daniélopolu (D.). **Des associations streptococciques dans le typhus exanthématique.**—*Presse Méd.* 1917. July 12. Vol 25. No. 39. pp. 403–404.

Daniélopolu calls attention, in this paper, to the relative frequency with which typhus fever is complicated by various streptococcal infections. These usually make their appearance either in the terminal stages of the fever or during convalescence, and he observed pleural suppuration, parotitis, otitis, erysipelas or the development of abscesses at the site of injections in 40 cases out of his series of 200. Although frequently the infection was found to be a mixed one, yet in two cases of pleural suppuration he isolated streptococci in pure culture. With regard to erysipelas the author states that this is not an uncommon complication and he met with it on nine occasions; of these seven died.

The author has met with 20 cases which developed abscesses at the site of injection and his experience has been confirmed by various colleagues. At first this was considered to be due to faulty technique but extreme care in sterilization and personal supervision led to no better results. This, added to the fact that the abscesses only occurred in some cases and usually appeared some time after the injection, convinced the author that the cause of the trouble was not external, and confirmed his belief that these various suppurative conditions are due to the circulation in the blood stream of a streptococcal infection.

He states that streptococcal complications occurring in the course of typhus fever are less serious than when such infections occur at the onset of the disease.

R. P. C.

Potel (René). **Observations cliniques et étiologiques sur les cas de typhus soignés à l'hôpital permanent de la marine de Sidi-Abdallah. Action du sérum antiexanthématique.**—*Arch. Méd. et Pharm. Nav.* 1917. June, July. Vol. 103, 104. Nos. 6, 1. pp. 440–447; 14–53. With 32 charts.

During an epidemic of typhus fever at Sidi-Abdallah [Tunis], during the period February-April, 1916, the author used Nicolle's anti-typhus serum [see this *Bulletin*, Vol. 8, p. 474] for the treatment of the most severe cases with marked success. The epidemic was practically confined to Serbian soldiers and the members of the French hospital ships which were evacuating the Serbian sick from Albania to Tunis. Amongst the Serbians the disease usually showed marked benignity—without exanthem or fever—and its existence was unrecognized until cases began to appear among the French hospital orderlies. The total number of cases was 528, of which 486 were Serbians and 42 French. Of these, 31 were treated with Nicolle's anti-typhus serum—24 French and 7 Serbians—these cases being the most severe of those which occurred after the institution of the serum treatment. The whole of the cases showed marked improvement of their general condition after injection, especially of the nervous symptoms. The action on the temperature and duration of the illness was also favourable, being particularly marked in the case of the Serbians who usually responded to the first

injection. In six cases, the temperature abruptly fell after one or two injections and the serum appeared to have the effect of cutting short the disease in its course. In many of the cases the disease was aborted from the 6th to the 12th day, and the average duration of the course of the disease was 11·61 days. Only one death occurred in this series, due to a general septicaemia supervening on an injection of camphorated oil. No other complications were observed.

The author recommends that the injections should be commenced as early as possible, even in doubtful cases—as no ill-effects have been noted. The method of administration recommended is by subcutaneous injection and the dose 10–20 cc. per day, repeated for 8–10 days in severe cases.

The author gives an account of the various measures taken to stamp out the epidemic, which should be consulted by those interested.

R. P. C.

Orticoni (A.). **Essais de sérothérapie du typhus exanthématique par injections intrarachidiennes de sérum de convalescents.**—*Bull. e Mém. Soc. Méd. Hôpit. de Paris.* 1917. July 12. Vol. 33. 3 Ser. No. 23–24. pp. 827–829.

In view of the unsatisfactory results attending the treatment of typhus fever by subcutaneous and intravenous injections of anti-typhus serum and of the fact that the nervous symptoms are so characteristic of the disease, the author has carried out treatment by means of intra-spinal (intra-arachnoid) injections in eight cases in which the nervous symptoms were unusually severe. The anti-typhus serum injected was obtained from convalescents—6–12 days after defervescence—and the usual technique was employed as to lumbar puncture. The injection had a marked effect on the general condition of the patient, the pulse and the nervous symptoms—irrespective of the period of the disease at which it was administered.

Of the eight cases treated by this method six recovered after injection of 20 cc. of the immune serum. All showed marked general improvement, the pulse became slower and more regular, facial congestion and conjunctivitis disappeared and the six patients who recovered made a normal defervescence on the 14th–16th day. One died of erysipelas during convalescence. The serum injected did not appear to have any effect on the length of the disease or the temperature curve.

Orticoni recommends two injections of 20–25 cc., at an interval of 24 hours, as early as possible after the appearance of the exanthem. If given whilst marked nervous symptoms are not obvious the author considers that the injection may prevent their appearance. In any case the injection would improve the general condition of the patient and promote sleep.

Orticoni states that, in view of the great difficulties attending the preparation and obtaining of the immune serum, he realizes this serotherapy cannot be generally used, but he considers that when available the method he advocates is preferable to either the subcutaneous or intravenous mode of administration. The work was carried out in Roumania.

R. P. C.

BAEHR (George). **Agglutination in Typhus Fever.**—*Jl. Infect. Dis.* 1917. July. Vol. 21. No. 1. pp. 21–27. With 1 fig.

In 1915, OLITSKY recorded that specific agglutinins, precipitins, complement-fixation bodies and opsonins for *B. typhi exanthematici* were regularly present in the blood of patients convalescent from typhus fever. He also stated that "agglutinins (and other antibodies) are usually absent at the height of the disease, but increase in amount at the crisis, until they reach their maximum well along in the apyrexial period." (See fig.)

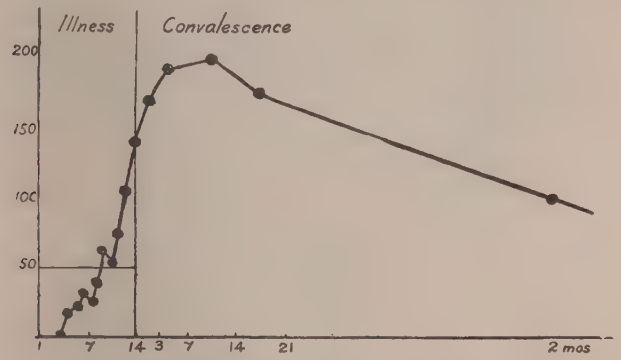

Fig. 1.—Agglutinin Curve in Typhus Fever.

[Reproduced by permission from the *Journal of Infectious Diseases.*]

During his investigations in Volhynia, during the first three months of 1916, Baehr has been able to confirm OLITSKY's observations on more abundant material and "to ascertain in more detail the course of the development of antibodies in this disease." In preparing the tests, the microscopic method was used: as "the relatively slow growth of the organism and its tendency to clump on standing made the macroscopic method of agglutination impracticable." Readings were made after one hour, at room temperature, and only definite agglutination into clumps was considered positive. Altogether, 271 agglutination tests were made on the serum of 100 persons with typhus fever. In 46 of these cases, from three to eight examinations were made during the course of the disease and early convalescence. The remainder were examined on one or two occasions only.

Agglutinins were demonstrable in 43 out of the 46 cases studied systematically (i.e., 93 per cent.); 28 non-typhus cases were examined as controls and were uniformly negative. No agglutinins were present in three of the typhus fever cases, examined four, five and six times respectively, during the course of the disease and early convalescence. In less than a third of the cases, agglutinins may be demonstrated in the blood at the end of the first week of the disease. During the course of the second week over two-thirds of the cases become positive and in early convalescence 97 per cent. of the cases gave positive results. Baehr suggests that the agglutination test is of diagnostic value in the latter half of the disease and he succeeded in proving its value in mild, atypical and ambulatory cases. These latter cases,

which Baehr states are common in Volhynia, "especially among the Russian peasantry," are "undoubtedly responsible for the spread of the disease."

Baehr was also able to confirm OLITSKY'S observation that when a blood culture, made during the disease, was negative, "the serologic examination, at that time, usually showed a high content of antibodies." "This observation would appear to indicate that the early appearance of agglutinins is an evidence of resistance to the disease, and is therefore of prognostic value. Unfortunately, however, the mortality in typhus fever is in part due to complications, chiefly pneumonia, erysipelas, and other infections."

The lighting up of the Widal reaction during the course of typhus fever, in persons who had previously suffered from typhoid fever or been vaccinated against it, was frequently observed both by the author and the German and Austro-Hungarian army bacteriologists in Russian Poland and Volhynia.

The results of agglutination tests made by Baehr at different stages of the disease, are given in the following table :—

Days of disease.	Number of examinations.	Number positive.	Percentage positive.
1–4	13	0	0
5–7	26	8	31
8–11	49	31	63
11–15	49	36	72
Convalescence.			
First week	53	47	88
Second week	26	25	97
Third week	20	18	90
After 2 months ..	13	10	77
After 3 months ..	11	6	55
After 10–14 months..	11	3	27

R. P. C.

BAEHR (George). **Development of Antibodies for** *Bacillus typhi-exanthematici* **in Typhus Fever Contacts.** — *Ibid.* Aug. No. 2. pp. 132–140.

Baehr states that individuals exposed to typhus fever infection may possess specific antibodies in their serum without having had any clinical manifestations of the disease. This paper records 20 such cases, each of which had been in intimate contact, recently, with typhus fever infection. Of these cases three, after their exposure to infection, had suffered from "vague general symptoms indistinguishable from an influenza." All the others had been well. Complement fixation tests were carried out with a typhus antigen, consisting of a clear Berkefeld filtrate of a 24 hours autolysate of *Bacillus typhi-exanthematici* previously killed by heating at 60° C. for one hour. This antigen, Baehr states, is absolutely specific and gave positive results only with the serum of typhus fever convalescents and in the group of 20 cases noted above. Uniformly negative results were obtained

in 150 control cases. These findings lead Baehr to assume that, at the time of the exposure to infection, the contacts had actually been infected with the bacteria, but in quantities insufficient to induce clinical manifestations.

R. P. C.

Paneth (L.). **Agglutinations-Studien bei Fleckfieber.**—*Arch. f. Hyg.* 1916. Vol. 86. No. 2 & 3. pp. 63–108. With 58 charts.

Working at one of the Austrian field laboratories, Paneth has investigated the agglutination curves for all the organisms which play a part in typhus fever. These investigations were carried out on about 300 cases of the disease and the development of the agglutinins of *B. coli*, *B. proteus*, *B. typhosus* and *B. typhi exanthematici* were examined. Paneth finds that the agglutinins of *B. coli*, *B. proteus* and *B. typhosus* make their appearance in the blood in the early part of the second week of the disease and increase steadily until they reach their maximum height at about the time that the temperature descends to the normal level. Within a few weeks they have disappeared completely from the blood. The agglutinins of *B. typhi exanthematici* also make their appearance in the early part of the second week of the disease, but develop more slowly and do not attain their maximum until the second week of convalescence. They then persist for several months. The curves for the formation of the agglutinins in the case of *B. coli*, *B. proteus* and *B. typhosus* are practically identical and differ markedly from that of *B. typhi exanthematici.*

R. P. C.

McCoy (G. W.) & Neill (M. H.). **Immunization against Typhus Fever. A Report of an Unsuccessful Attempt to Immunize Monkeys against Typhus Infection by Cultures of** *B. typhi exanthematici* **(Plotz).**—*Public Health Rep.* 1917. June 1. Vol. 32. No. 22. pp. 841–848. With 4 charts.

McCoy and Neill conclude, as a result of the above experiments, that bacterial vaccines prepared from cultures of *B. typhi exanthematici* do not protect monkeys against typhus infection. Six test monkeys were used and each received, subcutaneously, an injection of 1,000,000,000 organisms. In half, the organisms were given alive; in the other half the bacilli had been killed by exposure for one hour to 60° C. before use. No reaction followed. The subsequent injection, intraperitoneally, of a test dose of typhus virus resulted in all the monkeys exhibiting temperature curves characteristic of typhus fever infection. Typhus immune animals and non-vaccinated animals were used as controls.

R. P. C.

Olitsky (Peter K.). **Immunologic Studies in Typhus exanthematicus.** —*Jl. Immunol.* 1917. June. Vol. 2. No. 4. pp. 363–373.

An account of the relationship of *B. typhi-exanthematici* to typhus fever is given in which the author states that the organism has now been isolated from the blood of typhus fever patients in the United States, Serbia, Bulgaria, Russia and Mexico, from the blood and

spleens of typhus infected animals and from typhus infected lice. Identical agglutinins were found to be present in both endemic (New York) cases and epidemic (Balkan) cases, and Olitsky states that convalescent (immune) serum from one type of case agglutinated organisms isolated from the other. These agglutinins are also found in the serum of experimentally infected animals, with the exception of the guinea-pig.

In 43 typhus fever patients the agglutinins were found to be present in the serum, after the crisis, in 92 per cent., and rarely during the height of the fever or on the day of the crisis. These antibodies persisted for 5–6 months after the crisis.

The maximum titre for the agglutinins was found to be on the seventh or eighth day after the crisis. The agglutinins are regarded as specific and organisms other than the typhus bacillus are not agglutinated by typhus fever serum, with the exception of a strain of the Proteus bacillus. In this latter case the reaction rapidly disappears after the crisis and is always most marked during the course of the fever. "It is the persistence of the antibodies which characterises the causal agent of a disease."

Working with the protein of the typhus bacillus as antigen Olitsky was able to demonstrate that the formation of complement fixation bodies runs parallel to that of the agglutinins. They are capable of demonstration somewhat later and disappear sooner. Precipitin tests were carried out by using a polyvalent precipitogen of the typhus bacillus and the curve of formation corresponded with those of the agglutinins and complement fixation bodies.

Immune opsonins were determined not only in serum from typhus fever cases but also in the serum from animals immunized by repeated injections of the bacteria. Their formation agreed with that of the other antibodies. Immunized guinea-pigs, which showed none of the other antibodies, possessed these regularly. The writer also deals with Sellard's claims and the paper should be consulted by those interested in this discussion.

R. P. C.

Olitsky (Peter K.), Denzer (Bernard S.) & Husk (Carlos E.). **The Isolation of the *Bacillus typhi-exanthematici* from the Body Louse.** —*Jl. Amer. Med. Assoc.* 1917. Apr. 21. Vol. 68. No. 16. pp. 1165–1168.

This paper gives an account of the successful cultivation of *B. typhi-exanthematici* from infected body lice. Altogether six series of lice from five different patients were employed. The lice were removed from typhus patients between the 12th day of illness and the 4th day after the crisis. "From practically all these lice, the *Bacillus typhi-exanthematici* was isolated, sometimes in pure culture, in numbers varying from two colonies to an innumerable number of colonies." The medium used was a 0·5–2 per cent. glucose agar to which a third the volume of rich ascitic fluid was added.

Referring to the variability of *B. typhi-exanthematici* to Gram's stain, the authors are of opinion that the response to the stain varies with the virulence of the organism.

R. P. C.

Otto (R.) & Dietrich. **Beiträge zur "Rickettsien"-Frage.** [The Rickettsia Question.]—*Deut. Med. Woch.* 1917. May 10. Vol. 43. No. 19. pp. 577–580. With 4 figs & 3 charts.

The authors of this paper give details of the experiments they have made with a view to determining the rôle played by *Rickettsia* in typhus fever. Lice enclosed in a small box, provided with a fenestrated cover over which a layer of fine gauze was stretched, were imposed on the under surface of the arm or inner side of the thigh of typhus fever patients at various stages of the disease and for varying periods. Of the whole number of lice 55 per cent. were dead upon removal. Of the remainder, 20 per cent. were found to be infected with *Rickettsia* and 25 per cent. did not harbour the parasite in sufficient number to be diagnosed. The authors state that these numbers cover the total number of lice experimented with and add that of those lice which had fed on the patient for a sufficiently long period, 70–80 per cent. were infected. The best results were obtained when the lice were imposed on the 5th–7th day of the fever and permitted to feed during a period of 7–8 days. Of the lice placed on the patient towards the end of the disease only a few became infected—4–5 per cent. on the 12th day, and all were negative after the decline of the fever.

The first infected louse was found on the 4th day. The examination of the gut contents of the infected lice confirmed the findings of other workers, with regard to the numbers, form and staining properties of the organisms observed. In addition to the usual bi-polar staining organisms, they observed short rod-like and long filamentous forms. The thread-like forms were noted in the case of a louse taken from a patient on the 4th day and were absent in lice which had fed for nine days. The authors suggest that these forms may be transition stages in the life-history of one parasite.

Experiments made to determine whether the louse can transmit the virus to its young were all negative. The authors succeeded in infecting lice with *Rickettsia* by feeding them on a case of typhus *sine exanthem.* The serum of this patient gave a positive Weil-Felix reaction.

Attempts to transmit the infection to guinea-pigs, by the injection of the gut contents of infected lice, were only successful in a small percentage of cases [three are given]. The same changes and appearances were noted as occur in guinea-pigs inoculated with the blood of typhus fever patients. Agglutination experiments were also attempted by bringing the serum to be tested into contact with an emulsion of the gut contents of infected lice.

The paper should be consulted by those interested. R. P. C.

da Rocha-Lima (H.). **Zum Nachweis der *Rickettsia Prowazeki* bei Fleckfieberkranken.** [Demonstration of *R. p.* in Typhus.]—*Münch. Med. Woch.* 1917. Jan. 2. Vol. 64. No. 1. pp. 33–35.

Da Rocha-Lima states that, whilst it is not conclusively proved that typhus fever is caused by *Rickettsia prowazeki*, certain observers have noted organisms in this disease which are not dissimilar to it. Ricketts & Wilder, Gavino & Girard and McCampbell found it in the blood, von Prowazek in the leucocytes and da Rocha-Lima in the blood, in smears and in sections.

He considers that HANSER's observations on the organism found by him in skin-sections from cases of typhus fever are incorrect and the organism is not Rickettsia. The organism described by TOEPFER from typhus fever cases, he considers, is not unlike the bacterium described by RABINOWITSCH in 1909.

Da Rocha-Lima suggests the establishment of a central bureau to which preparations illustrating new or important work on typhus fever should be sent, and where their true value could be appraised.

R. P. C.

i. VITEČEK (Vladimir). **Die klinische Bedeutung der Weil-Felixschen Reaktion.** [Clinical Significance of the Weil-Felix Reaction.]—*Wien. Klin. Woch.* 1917. Aug. 2. Vol. 30. No. 31. pp. 967-972. With 8 charts.

ii. STERLING (Stefan) & STERLING (Kazimiera). **Beitrag zur Weil-Felixschen Reaktion.**—*Ibid.* pp. 972–974. With 5 charts.

i. As the result of exhaustive experiments with the Weil-Felix reaction carried out on 87 cases of typical typhoid, 15 cases of paratyphoid, one case of atypical typhoid and one atypical case of paratyphoid, in addition to 137 cases of various other diseases—dysentery, scarlatina, malaria, small pox, erysipelas, nephritis, etc., and 151 healthy controls, the author considers a strong positive reaction, at 1 : 50 or higher titre, to be absolutely specific and diagnostic of typhus. Of the controls 8·43 per cent. gave weak positive reactions in dilutions of 1 : 25, rarely 1 : 50, whilst of the 87 typhoids 8·04 per cent. gave weak reactions at 1 : 25 and 1 : 50. The titre attained in positive typhus cases is usually high and rarely below 1 : 200. The usual titre is 1 : 1,000. The author cites two cases in which the reaction was positive six months after the illness and one in which it persisted for over a year.

Strains of X_1, X_2 and X_{19} were used in this work and Vitecek recommends X_{19} as being more sensitive and giving a higher titre than the other strains.

ii. Using strains of X_{19} these authors carried out the Weil-Felix reaction on 555 cases, of which 311 were clinically typhus fever. The reaction was positive in 96 per cent. of the typhus cases and they consider the test of specific value at the end of the first and beginning of the second week of fever. Two cases of typhoid fever (of a total of 128 cases) agglutinated X_{19} at 1 : 200. For diagnostic purposes Sterling & Sterling recommend that a positive reaction at 1 : 200 should be obtained, as typhoid frequently gives a positive reaction at 1 : 100. The highest titre in typhus is obtained towards the end of the second week of the disease and declines gradually after this period.

R. P. C.

BALLNER (F.) & FINGER (A.). **Ueber die Weil-Felixsche Proteusreaktion mit dem Harne Fleckfieberkranker.** [The Weil-Felix Reaction with the Urine.]—*Wien. Klin. Woch.* 1917. Aug. 2. Vol. 30. No. 31. pp. 966–967.

Working with a strain of X_{19} Ballner and Finger state that they were able to obtain a positive Weil-Felix reaction with the urines of

typhus fever patients when this disease was complicated by damage to the kidneys and albumen was present in the urine. This phenomenon was observed in 23 cases of typhus complicated by nephritis, and the Weil-Felix reaction with the patients' serum was, without exception, positive. In 19 cases of typhus, without this complication, the Weil-Felix reaction with the urine failed entirely, although the serum of all these cases gave a positive result. Sixteen control cases of nephritis, without typhus, were negative.

R. P. C.

Dadej (K.) & Krahelska (M.). i. **Die Kurve der Weil-Felixschen Reaktion.**—*Münch. Med. Woch.* 1917. Oct. 16. Vol. 64. No. 42. pp. 1379–1381. With 16 charts.

ii. **Ueber die Weil-Felixsche Reaktion.**—*Ibid.* Oct. 23. No. 43. pp. 1408–1409.

In these papers Dadej and Krahelska state that, in their experience, the Weil-Felix reaction may vary considerably in different groups of cases. In the winter of 1916, working at Bilgorai [Poland] during a small epidemic of typhus fever they examined the serum of 65 typhus patients with this test. Sixty-three gave a positive reaction; the other two failed to give the reaction although clinically they were typical cases of the disease. Of the positive cases, 93 per cent. agglutinated the organisms at dilutions between 1 : 50 and 1 : 1,000 and 3 per cent. worked at dilutions as high as 1 : 1,500–1 : 3,000. The appearance of a clearly positive reaction (1 : 50 or higher titre) preceded the crisis in 75 per cent. of the cases. The remaining 25 per cent. gave the reaction after the crisis or during the course of the third week. The authors call attention to the great variation which is shown by individual sera with regard to the height of the agglutination titre at its first appearance and also as to the period during which this property persists.

Working at Piaski (near Lublin), during the spring, with the sera of 20 typhus fever patients, Dadej and Krahelska found the average titres considerably higher and 95 per cent. showed titres of 1 : 500 or over. In 5 per cent. of the cases the titre was between 1 : 100 and 1 : 500, in 30 per cent. between 1 : 500 and 1 : 1,000, in 40 per cent. between 1 : 1,000 and 1 : 1,500, in 20 per cent. between 1 : 1,500 and 1 : 10,000 and in 5 per cent. over 1 : 10,000. One case agglutinated at a dilution of 1 : 32,000. In the Piaski cases the reaction occurred earlier than in the Bilgorai cases, 90 per cent. exhibiting it before the crisis.

R. P. C.

Schuerer (J.) & Stern (W.). **Zur serologischen Diagnose des Fleckfiebers.**—*Münch. Med. Woch.* 1917. July 3. Vol. 64. No. 27. pp. 886–887.

As a result of their researches, on the serological diagnosis of typhus fever, the authors state the following as their conclusions :—

1. Agglutination of Proteus strain X_{19} in a serum dilution of 1 : 50 is positive proof of typhus fever.

2. In the event of a living culture not being available, the test can be carried out with a culture to which a 1 per cent. solution of formalin has been added. Such a culture can be kept for weeks.

3. "Contacts" of typhus fever cases which showed, for short periods, some degree of fever, all gave a negative Weil-Felix reaction. The authors consider that this proves that abortive or mild types of this disease do not occur.

These investigations were carried out with three dilutions only—1 : 25, 1 : 50 and 1 : 100—and in the case of no other disease than typhus was an agglutination obtained in dilutions as high as 1 : 50. Of 58 typhus cases examined 54 were positive, two agglutinated at a dilution of 1 : 25 and two were completely negative. One of the negative cases was a convalescent of 28 days. Sixty non-typhus cases gave uniformly negative results.

R. P. C.

Zeiss (Heinz). **Zur Aetiologie des Fleckfiebers.**—*Deut. Med. Woch.* 1917. Sept. 27. Vol. 43. No. 39. p. 1227.

Zeiss claims to have been successful in isolating an organism of the Proteus group, which resembles X_{19} in its agglutinating properties, from the living subject in 19 cases of typhus fever. On 18 occasions it was isolated from the blood and once from the pus of a post-typhus abscess. It was not found in any case after the fortieth day from the commencement of the fever. All the organisms resembled X_{19} in their properties and no organism resembling X_2 is recorded. The work was carried out in Asia Minor between February and April, 1917. Zeiss states that Felix and his collaborator had been dependent for their strains upon post-mortem typhus material and had not succeeded in isolating them from the living patients.

A table is given which shows that the majority of the successful cultures was made before the twentieth day. All control non-typhus cases were negative.

R. P. C.

i. Neuber (Bruno). **Ein Fleckfieberdiagnostikum.** — *Münch. Med. Woch.* 1917. May 22. Vol. 64. No. 21. pp. 695–696.

ii. Csépai (Carl). **Ein Fleckfieberdiagnostikum.** — *Ibid.* June 26. No. 26. p. 863.

iii. Bien & Sontag (F.). **Herstellung eines haltbaren Fleckfieberdiagnostikums.**—*Ibid.* Oct. 23. No. 43. p. 1409.

The production of a permanent means for carrying out the agglutination reaction in typhus fever is dealt with in each of the above papers. Neuber suggests that cultures of X_{19}, killed by the addition of a 1 per cent. solution of phenol, would furnish such a means. Csépai uses heat for the same purpose and claims to have had successful results from the use of cultures killed in this manner. Bien and Sontag consider both the above methods to be unsatisfactory and suggest the use of cultures of X_{19} killed with alcohol after preliminary treatment with a 0·5 per cent. solution of phenol.

R. P. C.

NEILL (M. H.). **Experimental Typhus Fever in Guinea Pigs. A Description of a Scrotal Lesion in Guinea Pigs infected with Mexican Typhus.**—*Public Health Rep.* 1917. July 13. Vol. 32. No. 28. pp. 1105–1108.

The striking similarity of typhus fever and Rocky Mountain spotted fever led the writer to examine male guinea-pigs, infected with Mexican typhus virus, for scrotal lesions similar to those which are uniformly present in Rocky Mountain spotted fever. The guinea-pigs were inoculated directly from human cases of the disease or from guinea-pigs and monkeys in which the virus was being propagated. They were inoculated intraperitoneally and killed at the height of the febrile reaction. Of 37 guinea-pigs, 26 showed scrotal lesions. The lesions are described by the author as follows :—

"The skin of the scrotum looks apparently normal, but if it be carefully dissected from the tissues immediately beneath, definite haemorrhages appear in the cremasteric fascia, just external to the parietal laminae of the tunica vaginalis. If these structures be incised and the testicle and epididymis exposed, haemorrhages of a similar nature will be noted immediately beneath the visceral laminae of the tunica vaginalis. The extent of these haemorrhages varies, from a few minute petechiae to nearly complete envelopment of the testicles by haemorrhagic areas. If the animal be examined at the height of the process, i.e., one to two days after the swelling is first noted, the lesions above described are indistinguishable in their gross appearances from the lesions of Rocky Mountain spotted fever at the same stage of development of the disease, that is, one or two days after the swelling of the scrotum is first noted . . . . the lesions of typhus fever rapidly clear up and soon the animal is as well as ever."

FRANKEL, ASCHOFF and POINDECKER have described certain histological changes in typhus fever, especially as regards the exanthem, which the writer has been able to confirm. All these workers "describe as characteristic, lesions of the smaller arteries, consisting of necrosis of the intima and the perivascular accumulation of cells among which, as in spotted fever, the mononuclear elements predominate."

The writer considers it desirable to state that the non-identity of typhus fever and Rocky Mountain spotted fever has "apparently been thoroughly established by immunological studies." R. P. C.

NICOLLE (Charles). **Cent passages successifs du virus exanthématique par cobayes.**—*Bull. Soc. Path. Exot.* 1917. July. Vol. 10. No. 7. pp. 526–528. With 2 charts.

Nicolle announces in this paper that a Moroccan strain of typhus fever, with which guinea-pigs were first inoculated on May 25th 1914, has now been subinoculated a hundred times and still remains as virulent for monkeys and guinea-pigs as when first isolated. The virus thus obtained is employed by him in the preparation of a curative serum for typhus fever. R. P. C.

PLOTZ (Harry), OLITSKY (Peter K.) & BAEHR (George). **Studies in Prophylactic Immunization with *Bacillus typhi-exanthematici*.**—*Jl. Amer. Med. Assoc.* 1916. Nov. 25. Vol. 67. No. 22. pp. 1597–1598.

This is a preliminary note on the result of anti-typhus vaccination experiments carried out in Russia and the Balkans. Altogether 8,420

persons, mostly members of hospital and sanitary units, were vaccinated against typhus—an attempt being made to include only those persons most exposed to infection. Of this number six developed the disease during the four months of the epidemic. The authors conclude that the vaccine is capable of appreciably reducing the incidence of the disease, but not that it confers absolute immunity.

The vaccine used consisted of a suspension of fifteen strains of *B. typhi-exanthematici*, in physiological sodium chloride solution, which had been subjected to a temperature of 58°–60° C. for ½–1 hour. After being tested anaerobically and aerobically, as to sterility, it was diluted so that each cubic centimetre contained two billion organisms, and 0·5 per cent. phenol was added. Three injections—0·5 cc., 1 cc. and 1 cc.—were given at 5–6 day intervals.

R. P. C.

Robertson (Muriel). **Typhus Fever: An Experiment on Vaccination with a Coccus derived from Human Cases.**—*Jl. Path. & Bact.* 1917. Apr. Vol. 21. No. 2. pp. 173–183. With 12 charts.

This paper describes two series of experiments made by Miss Robertson in an attempt to vaccinate against the virus of typhus fever. The organism used for the vaccine was the coccus isolated by Penfold, from the blood and urine of two typhus fever patients, during the Belfast outbreak in July, 1914. The animals used for the experimental work were monkeys and controls were used in each series. The typhus fever blood was obtained from human cases at Kildysart, co. Clare. After preliminary vaccination with Penfold's coccus the animals were inoculated intraperitoneally with from 2½–4 cc. of citrated typhus fever blood. Miss Robertson found that the preliminary vaccination had no protective value and considers that "no evidence was obtained of a causal connection between the coccus found in the blood and the clinical condition known as typhus fever." Miss Robertson succeeded in isolating the same coccus from two further human cases. The paper is illustrated by numerous charts.

R. P. C.

KALA AZAR.

CORNWALL (J. W.) & MENON (T. Kesava). **A Contribution to the Study of Kala-Azar (III).**—*Indian Jl. Med. Res.* 1917. Apr. Vol. 4. No. 4. pp. 672–687.

For the review of the first two parts of this contribution see this *Bulletin*, Vol. 8, p. 403 and Vol. 9, p. 229. The third part now under consideration is divided into seven sections as follows :—

"1. The Relation between Flagellates and Bacteria.
"2. Can Bugs regurgitate Bacteria ?
"3. History of a Monkey inoculated with *L. tropica.*
"4. Sixth Negative Transmission Experiment.
"5. Eighth Consecutive Successful Culture of *L. donovani* from the Peripheral Blood.
"6. Culture of *Leishmania* in NNN Medium prepared with Blood other than that of the Rabbit.
"7. Summary."

1. Assuming that flagellation of *L. donovani* and *L. tropica* cannot occur in the stomach of a bug containing abundant bacteria the number of species which can function as hosts is limited. Experiments were therefore made to elucidate the effect of bacteria on flagellates, especially Leishmania flagellates. Flagellates of *L. donovani* and *L. tropica* continued to multiply in NNN culture tubes to which the soluble products of bacterial metabolism had been added. Other cultures to which autolysed bodies of dead bacteria were added also shewed no inhibition of growth. It is concluded that the destruction of flagellates which takes place in cultures contaminated by bacteria is primarily due to exhaustion of the available nutriment. *L. donovani* flagellates are definitely more susceptible to the effect of bacterial contamination than *L. tropica.* Comparable to the destruction which takes place *in vitro* is that which is found quickly to occur when bugs are fed on bacterially contaminated citrated blood plus Leishmania flagellates.

The statement made in a previous contribution [*loc. cit.* p. 229] that viable forms of *L. donovani* and *L. tropica* are apparently not passed in the faeces of *Cimex rotundatus* is now modified, the authors having found several active *L. donovani* flagellates in the intestine and two active flagellates in the rectum of a bug which had been fed on July 29 on sterile citrated rabbit blood containing *L. donovani* flagellates, and subsequently re-fed on August 2, 7, and 12, on sterile citrated rabbit blood only. The dissection was made on August 16. *Cimex rotundatus* was fed upon herpetomonads obtained from Lygeid bugs and added to citrated rabbits' blood. The herpetomonads could not be freed from bacteria. In contrast to what takes place with the flagellates of *L. donovani* and *L. tropica* it was found that large numbers of the parasites survived to reach the rectum.

2. This investigation was made on account of its bearing upon the possible transmission of leishmania. Experiments made by other workers are discussed. The authors experimented with *Staphylococcus citreus*, *Staphylococcus albus*, and *B. pyocyaneus.*

"*Cimex rotundatus* frequently succumbs after a feed infected with bacteria. If it survive, the infecting organism sometimes is, and sometimes is not, recoverable by culture from its stomach. In no case did infected bugs prove to be able to infect a sterile culture medium in the act of feeding. The transmission of bacterial infections in nature by bugs in the act of biting is probably a rare occurrence."

3. A monkey (*Macacus sinicus*) was successfully inoculated by rubbing into a scarified area of skin a primary culture of flagellates from a human Oriental Sore. Cultures made at intervals from the blood on NNN tubes proved to be sterile. Bugs, fed at intervals on the animal, failed to become infected. A white rat and a rabbit were inoculated with negative result with material from the lesion at a time when it contained numerous parasites. The inoculations were made both by skin scarification and rubbing, and by subcutaneous infection. *L. donovani* and *L. tropica* flagellates grew readily on NNN tubes prepared with the monkey's blood after recovery from the Oriental Sore. It is concluded that the animal suffered no systemic infection.

4. Bugs were fed on sterile citrated rabbit blood containing *L. donovani* flagellates. They were re-fed on sterile citrated rabbit blood, four, nine, and fourteen days later, these feeds being then distributed in NNN tubes. The result, as in five previous experiments was negative, though the bugs were proved after each feed to be still infected.

5. The patient had not suffered from pyrexia for three weeks at the time the culture was made, shewing that flagellates may be cultivated from the peripheral blood even during apyrexial periods. The blood was distributed in 12 NNN tubes. Eight of these remained sterile. "Not less than ten or twelve culture tubes should be used, otherwise parasites, if scanty, may not be secured."

6. "Both *L. donovani* and *L. tropica* flagellates grow well in subculture in NNN medium prepared with the blood of *Macacus sinicus*."

E. J. Wyler.

Row (R.). **Evolution of the Diagnostic Methods in Kala Azar with a Special Reference to a Technique for Intensive Culture from the Patient's Finger Blood. Lecture delivered at the Annual Meeting of the Grant College Medical Society.**—*Trans. Grant Coll. Med. Soc.* 8 pp. With 6 plates.

After an historical account of the diagnostic methods in kala azar the author describes, as follows, the technique for "intensive culture" by which he is able to obtain growth of flagellates from the peripheral blood in about six days :—

"The main principle of obtaining a culture in so short a time as six days depends on the fact that k.a. blood serum contains some inhibitory bodies such as either destroy the scanty parasites or parasites of poor vitality already in the grip of the leucocytes so that even at best it takes a long time for those surviving these destructive influences, to flagellate ; and I found that those destructive influences could be reduced to a minimum, by diluting the blood as you get it from the finger tip by introducing the few drops one takes up directly into say fifteen to twenty cc. of citrated saline solution before the blood has had time to clot. This diluted blood can be at once centrifugalised and the deposit of corpuscles planted directly into suitable culture media, e.g., the classical NNN medium or a simplified haemoglobin saline going by my name. Here I may state that I have been able to ascertain that the blood taken in this way from an up-country case 72 hours previously, is good enough for culture so that provided the blood is taken aseptically, it can with safety be transmitted to a central laboratory for culture in 3 or 4 days."

E. J. W.

PATANÈ (Carmelo). **Sul primo caso autoctono di Leismaniosi interna in Cirenaica.** [The First Indigenous Case of Internal Leishmaniasis reported from Libya.]—*Pathologica.* 1917. July 1. Vol. 9. No. 207. pp. 181–183.

According to the author, nearly all the cases of internal leishmaniasis hitherto reported from North Africa, between the limits of Morocco and Egypt, have been in European immigrants, chiefly Italian; out of 55 recorded cases only four occurred in natives. For two years, during which the author was quartered in Libya, he examined native patients systematically for signs of leishmaniasis without finding more than one case, the rarity of malaria in this region rendering the diagnosis relatively easy. In one native child, aged only 18 months, who presented signs of hereditary syphilis, along with an enlarged liver and spleen, smears of spleen-juice showed a few Leishman-bodies. The diagnosis was confirmed by cultivation on NNN medium, a growth being obtained in six days of the flagellated form of the parasite. The patient was not seen on any subsequent occasion, so that the case could not be followed up. The author, however, also observed in the same locality two other cases of splenomegaly in infants, of the type reported by other Italian observers in which careful observation does not detect either Leishman-bodies or any other blood-parasite.

J. B. Nias.

GONZÁLEZ BARRIO (Nieves). **Estudios sobre la anatomia patológica del kala-azar infantil (Leishmaniosis infantum).** [Studies in the Pathological Anatomy of Infantile Kala Azar.]—*Bol. Inst. Nac. Higiene de Alfonso XIII.* 1917. June 30. Vol. 13. No. 50. pp. 117–136. With 3 plates.

A study of the histology of infantile kala azar, mainly devoted to technical minutiae. The three photographic plates which illustrate the paper are unfortunately not very successful in rendering detail. Specialists will do well to consult the original paper.

J. B. N.

ROGERS (Leonard). **Further Experience in the Tartar Emetic Treatment of Kala-Azar including its Use in Young Children.**—*Indian Med. Gaz.* 1917. July & Aug. Vol. 52. Nos. 7 & 8. pp. 241–244; 265–269.

This paper embodies the details of seventeen further consecutive cases (including a series of six recoveries in children from an advanced condition of the disease), successfully treated in the European General Hospital, Calcutta, and of thirteen consecutive cases in natives. For the author's previous papers on eighteen cases see this *Bulletin*, Vol. 8, p. 3 and Vol. 9, p. 231. No instance of relapse has been noted among the total of 35 European cases, the majority of which have been either seen or heard of from several months up to over a year after discharge from hospital.

The salient features of the new cases, in which all the blood counts were made by the author, are shown in the following tables:

TABLE I.

Kala Azar treated in the European General Hospital, Calcutta.

Number of case.	Age in years.	Duration before admission in months.	Days in hospital.	Duration of fever under tartar emetic.	Centigrammes tartar emetic to end of fever.	Total tartar emetic in centigrammes.	Maximum dose of 2 per cent. solution.	DATA BEFORE AND AFTER TREATMENT.					Results.
								Enlargement of spleen below ribs.	Weight before treatment: gain or loss.	Red corpuscles.	White corpuscles.	Ratio white to red.	Parasites.	
							c.c.	in.	lbs.					
19	6½	7	245	85	100	142	3½	5½ –3d*	31 +14¾	2,780,000 5,010,000	1,500 6,000	1-1820 1- 436		Cured.
20	9	8	300	68	79	109	4	6 ?	50½ +20½	2,960,000 4,200,000	1,625 5,750	1-1969 1- 730		Do.
21	6	8	260	98	40½	100½	5	8 ?	43 +1½	3,890,000 3,284,000	2,625 5,750	1-1482 1- 570		Do.
22	6	12	142	80	123	189	4	3 ?	28 ..	2,460,000 4,300,000	1,000 4,000	1-2460 1-1075		Do.
23	8	6	130	66	95	153	4	5½ –1d	36¼ +3¼	2,930,000 4,440,000	1,750 4,000	1-3907 1-1110		In hospital much improved.
								8	48	3,740,000	1,625	1-2301	+	Cured.

								4	$52\frac{1}{4}$	4,240,000	3,250	1- 303	+	Do.
25	14	$5\frac{1}{2}$	161	46	115	418	$7\frac{1}{2}$	-4d	+9	5,020,000	6,000	1- 837		
								6	$50\frac{3}{4}$	3,310,000	2,000	1-1655	+	Do.
26	12	5	116	24	35	118	4	-6d	$+5\frac{1}{4}$	5,440,000	12,000	1- 453		
								$2\frac{1}{2}$	$65\frac{1}{2}$	4,390,000	4,250	1-1033	+	Do.
27	20	3	202	31	46	240	10	..	$+29\frac{3}{4}$	3,740,000	9,500	1- 393		
								$4\frac{1}{2}$	51	4,110,000	2,500	1-1646	+	Do.
28	13	$\frac{1}{2}$	150	51	154	298	10	-2d	+3	4,910,000	4,750	1-1034		
								3	$35\frac{1}{2}$	4,090,000	2,600	1-2045	+	Do.
29	9	1	131	45	43	71	5	-2d	$+21\frac{3}{4}$	5,410,000	3,000	1-1803		
								$3\frac{1}{2}$	83	..	..	..	+	Improved.
30	30	4	24	..	..	41	5	± 0	+4	..	..	..		
								3	38	4,970,000	4,000	1-1242	+	Cured.
31	10	2	96	30	20	104	10	-3d	$+5\frac{1}{2}$	..	..	..		
								3	$102\frac{1}{2}$	4,310,000	1,375	1-2297	+	Do.
32	24	4	70	4	12	262	10	$-2\frac{1}{2}$d	$+18\frac{1}{2}$	..	..	..		
								6	54	2,010,000	1,125	1-1786	+	In hospital
33	15	1	90	17	42	288	8	-6d	+21	4,380,000	9,250	1- 474		apparently cured.
		(days)						2	$79\frac{1}{2}$	4,360,000	5,250	1- 830	+	Do.
34	14	9	85	16	80	200	8	-1d	+7	4,920,000	6,250	1- 787		
								1	$77\frac{1}{2}$	3,220,000	2,500	1-1258	+	Cured.
35	22	2	58	18	82	138	7	-1d	+11	..	..	..		

*Decreased in size.

TABLE II.

Kala Azar in Indian patients in the Medical College Hospital.

Number of case.	Age in years.	Duration before admission in months.	Days in hospital.	Duration of fever under tartar emetic.	Centigrammes tartar emetic to end of fever.	Total tartar emetic in centigrammes.	Maximum dose of 2 per cent. solution.	DATA BEFORE AND AFTER TREATMENT.					Results.
								Enlargement of spleen below ribs.	Weight before treatment: gain or loss.	Red corpuscles.	White corpuscles.	Ratio white to red.	Parasites.	
							c.c.	Ins.	lbs.					
1	35	7	70	25	69	119	6	5 –2*	89½ +5	3,580,000 ..	2,500 ..	1-1432 ..	+ –	Cured.
2	12	7	90	22	81	109	3¾	4 –1d	38½ +16	2,120,000 4,770,000	5,250 7,500	1- 404 1- 636	+ –	Do.
3	16	12	79	25	102	135	5½	5 –3½d	63½ +9¼	1,950,000 2,820,000	1,125 4,750	1-1233 1- 589	+ –	Do.
4	30	18	56	20	115	234	7	5½ –4d	99 +5·9	3,450,000 4,770,000	3,125 8,750	1-1104 1- 545	+ –	Do.
5	23	12	70	42	96	124	4	5 –3d	70·4 +2·4	3,880,000 4,120,000	2,625 ..	1-1468 ..	+	Do.

6	26	9	53	28	128	196	7	$-1\frac{1}{2}$d	+13·8	3,200,000	2,750	1-1161		
7	28	5	37	20	72	96	$6\frac{1}{2}$	$2\frac{1}{2}$ -2d	94·0 +3·8	3,430,000 4,230,000	1,125 3,750	1-3049 1-1128	+ -	Do.
8	26	6	44	28	163	227	7	4 -2d	93·4 +5·12	2,620,000 ..	2,125 ..	1-1233 ..	+ -	Do.
9	20	12	47	26	48	75	$6\frac{1}{2}$	$4\frac{3}{4}$ $-2\frac{1}{2}$d	74·0 +2·14	3,490,000 ..	3,375 ..	1-1036 ..	+ ..	Much improved.
10	8	6	52	38	12	25	$2\frac{1}{2}$	11 -	$41\frac{1}{2}$ $+2\frac{1}{2}$	5,820,000 ..	8,750 ..	1- 665 ..	.. ..	Improved.
11	22	12	26	24	80	80	$6\frac{1}{2}$	6 2d	120·0 +3·4	4,060,000 ..	5,250 ..	1- 773 ..	+ ..	Do.
12	18	4	21	..	..	39	$5\frac{1}{2}$	$5\frac{1}{2}$ $-\frac{1}{2}$d	87·8 -3·8	3,360,000 ..	1,875 ..	1-1792 ..	+ ..	No change.
13	25	12	10	..	..	45	6	7 $\pm$0	97·12 +2·4	2,120,000 ..	1,250 ..	1-1696 ..	+ ..	Do.

*Decreased in size.

In five of the cases (children) spleen puncture was not performed. They were, however, considered to be clinically typical. The results of inunctions of metallic antimony and of subcutaneous injections of antimony oxide in young children were not encouraging. In very young children the use of a general anaesthetic for intravenous injection is advised.

As compared with the earlier series of cases, reduction in the duration of treatment before fever ceased in patients upwards of ten years of age, as seen in the last eleven cases in Table I and in the first eight cases in Table II (those natives who remained a sufficient time under treatment), was effected by the quicker raising of the dose of the 2 per cent. solution to the effective point of 5 cc. and over.

"In debilitated subjects, who form the great majority of kala azar patients, the doses of tartar emetic should not be repeated oftener than every third day, as, during the first few weeks, the injections may be followed by considerable temperature reaction. In more favourable cases, the first few comparatively small doses may sometimes be given every other day if reaction is not severe, until 5 cc. doses are reached in adults, when every third day will be better."

It is mentioned that two fatalities have followed the intravenous injection of tartar emetic. In one, the patient had received several doses, gradually increasing up to 6½ cc. He then received 7 cc. but collapsed and died three hours later. At the autopsy, pleural effusion, hydro-pericardium, and ascites were found. The author does not advise increase of dose above 5 cc. of the 2 per cent. solution in debilitated Indian patients. In the second fatal case treated by an inexperienced practitioner the dose was increased from 4 cc. to 7 cc. of the 2 per cent. solution in a very debilitated patient. No serious complication was found post-mortem.

About one thousand intravenous injections of the drug have been given in the European General Hospital, with only one case of temporary collapse. A warning is given against the injection of insoluble preparations of antimony, the author having been informed of a death due to pulmonary embolism following such an injection. From a survey of nearly one thousand injections in kala azar cases the author has formulated the following rules as to dosage:

"The *maximum* dose which is required to destroy the parasites when given every third day, or twice a week, over some two or three months, is approximately 1 cc. of the 2 per cent. solution (equal to 2 centigrammes of tartar emetic) for every 10 lbs. of body weight, with a maximum of 10 cc. in adult Europeans in a good general condition and of 7 cc. in Indian patients in a similar favourable stage. This maximum dose should only be reached very gradually, and to commence with, not more than one half of it, or 1 centigramme per 10 lbs. weight, should be given to persons of 12 years and upwards, and then only if they are not very debilitated. In children of a younger age, as well as in older patients in a weak condition, the dose should not at first exceed one-third of a cc. per 10 lbs. body weight. Under this rule the dose for adults who are not very debilitated may be 4 cc. to begin with, and be increased by half a cc. at a time up to the above limits, provided severe nausea, sickness, or faintness are not produced. In a debilitated young child, say, of six years weighing only about 30 lbs. such as cases 19 and 20 in Table I, only 1 cc. should be given for the first dose, and increased by not more than ⅓ to ½ cc. at a time up to 3 cc."

One case is cited in which, through too early cessation of treatment, the patient relapsed, but further injections failed to relieve the symptoms. It is suggested that this may be an instance of the development of antimony-fast parasites.

Estimation of the coagulability of the blood before undertaking spleen puncture may prove to be a desirable precaution. The author has not yet obtained sufficient data for final conclusions but in two cases out of about twenty in which the clotting time was dangerously low and was not raised by administration of calcium chloride, this was effected by injection of horse serum and puncture was performed without ill effect.

E. J. W.

MUIR (E.). **Some Further Hints on the Treatment of Kala-Azar with Antimony Tartrate.**—*Indian Med. Gaz.* 1917. Sept. Vol. 52. No. 9. pp. 317–319.

For the author's previous communications on this subject, see this *Bulletin*, Vol. 8, p. 3 and Vol. 9, p. 234.

The remarks in the article now under consideration are based on a further experience of 143 in-patient cases in all stages of the disease. Their ages were as follows: 25 below six; 56 six to twelve; 26 thirteen to sixteen; 21 seventeen to twenty-five; 15 above twenty-five. Ninety-seven were discharged cured after fever had been absent for at least two months. In seventy-two of the cases in which the diagnosis was not considered quite certain, this was confirmed by spleen puncture. Of the forty-six patients not discharged as cured, thirty-three discharged themselves, and thirteen died. The latter were all in the last stages of the disease.

The commonest complications in advanced conditions are: broncho-pneumonia, diarrhoea or dysentery, low blood-pressure, and sloughing of the connective tissues, and it is pointed out that antimony-tartrate may, when given injudiciously, itself cause or aggravate them. It is recommended, therefore, that at the beginning of treatment of advanced cases the patient be kept lying down, guarded against chills and rigidly restricted in diet, the last being particularly necessary on recovery of appetite after the first few injections.

Emetine is useless in kala azar dysentery. Digitalis should be given freely for rapid pulse with low blood pressure to counteract the danger of syncope. Increase of the dose of tartar emetic should be governed by the tolerance of the patient as evidenced by the amount of febrile re-action, coughing, and nausea produced (these should never be allowed to become more than slight) together with careful consideration of the state of the pulse, bowels and lungs. The above cautions are more particularly applicable to cases coming under treatment after the first four or five months of the disease.

In advanced cases with oedema, intestinal symptoms, and low blood-pressure with rapid pulse, treatment should begin with very small doses and be very cautiously increased. In his extensive experience the author has had only one death following spleen puncture. This fatality was, in his opinion, due to disregard of the following rules which, when adhered to reduce the danger to a minimum:

"(1) If the patient is too young to lie quietly chloroform should always be given. (2) The patient should lie flat on his back with his arms above his head and be told to breathe quietly. (3) The point selected should be immediately below the costal margin and half way between the anterior and the posterior margins of the spleen. There is slight upward and downward movement at this level but not the antero-posterior movement

got lower down, with the result that adhesions form more easily between the splenic and peripheral peritoneum and stop any possible haemorrhage. (4) I find it a good plan to apply a little pure carbolic to the point of selection making a white patch of the size of a two-anna piece. This sterilises the skin and makes it anaesthetic. (5) A fairly fine needle about an inch in length should be used, but not too fine to draw up blood easily, and an all-glass 20-minim syringe with good suction. (6) The needle should be introduced at right angles to the spleen but sloping slightly upwards along the long axis of the spleen. Only the outer layers of the abdominal wall should be punctured at first and one should then wait till the patient, who may have caught his breath, is again breathing quietly. The needle should then be introduced suddenly well into the spleen so as not to scratch its surface, which is the commonest cause of haemorrhage. If the patient is fatter than is usual in kala-azar patients a longer needle should be used. (7) Suction is applied for a few seconds and the piston allowed to recoil slowly. The needle is then withdrawn suddenly, and it will generally be found that a small drop of blood can be squirted out of the needle into the slide. Should there be no blood the process must be repeated making longer suction. Should a large quantity of blood be at once withdrawn a venous sinus has been pierced and it may be very difficult to find any parasites. (8) The patient should continue to lie on his back for at least half an hour and firm pressure should be applied manually below the left costal margin so as to cause demobilisation."

E. J. W.

Brahmachari (U. N.). **Fourth Report on the Treatment of Kala-Azar and Some Blood Reactions in this Disease.**—*Indian Med. Gaz.* 1917. Sept. Vol. 52. No. 9. pp. 319–322.

A few cases were treated with the following antimonial preparations, some being given intramuscularly and others intravenously: tartar emetic and antimony sod. tart.; lithium emetic; aniline emetic; antimonious oxide in a fine state of subdivision; luargol (a compound of antimony, silver, and arsenic); colloidal oxide of antimony; bismuth tart. solubilis. For details of these the original paper and the author's book on the treatment of kala azar [reviewed in the last issue of the *Bulletin*] must be consulted.

Certain blood reactions in kala azar are dealt with in a "preliminary report:"

1. The relative haemoglobin value of the resistent erythrocytes during haemolysis.—It is found that this factor is markedly diminished.

2. The complement deviation reaction.—Fleming's modification of the Wassermann test was used in a series of eight cases with six positive results. Using the original Wassermann method, one case out of four proved to be positive.

3. Haemalkalinity.—The average basic reactivity was found to be ·092 normal as compared with ·178 normal in a series of healthy students.

4. Haemsalinity.—The average was found to be ·6538 per cent. as compared with ·6654 per cent. in a series of healthy students.

5. A precipitate of the nature of a globulin is often obtained when the whole blood of a kala azar patient is mixed with excess of distilled water and also when the serum alone is so treated. A similar precipitate has been found to be obtainable in other diseases. A solution of the precipitate in normal saline inhibits the action of complement in a haemolytic system.

The author draws attention at the beginning of his paper to the fact that a large percentage of cases of splenic enlargement of unknown nature are admitted to the medical wards in Calcutta, in which the parasites neither of malaria nor of kala azar are to be found by splenic puncture.

E. J. W.

Longo (A.). **Sopra alcuni casi di Kala-azar infantile trattati col tartaro stibiato.** [Some Cases of Infantile Leishmaniasis treated with Tartar Emetic.]—*Pediatria.* 1917. Aug. Vol. 25. No. 8. pp. 449–468.

Notes of some 43 cases of infantile leishmaniasis treated in an out-patient department with injections of tartar emetic after Vianna's method. The author admits that the results were not very satisfactory, owing to the irregularity of attendance of the patients and, in some cases, to the unwillingness of the parents to allow the treatment to be continued. The results are tabulated. In four cases death seemed to be directly due to the tartar emetic, the final dose in each case being between 4 and 5 centigrammes of the drug. The author recommends that for out-patient practice, where the children are taken home by their parents, the dose should be limited to something between 1 and 4 centigrammes, given at intervals of not less than 3 to 4 days.

J. B. N.

Nicolle (Charles). **Chronique du kala azar en Tunisie.**—*Arch. Inst. Pasteur de Tunis.* 1917. Oct. Vol. 10. No. 1–2. pp. 90–93. *Bull. Soc. Path. Exot.* 1917. Oct. Vol. 10. No. 8. pp. 715–719. With 1 map.

Fifty cases of infantile kala azar have been diagnosed by microscopic examination in Tunis during the decade 1907–17. Their geographical distribution is shown on a map.

Eighty-six per cent. of the cases occurred in children of Italian or Maltese parentage. The disease is uncommon in natives. The predominance in children of European parentage is explained by the fact that the disease is in some instances imported from Sicily, Malta and Southern Italy, and that the children are allowed to come into close association with dogs.

E. J. W.

i. Christopherson (J. B.), **Notes on a Case of Espundia (Naso-Oral Leishmaniasis) and Three Cases of Kala-Azar in the Sudan treated by the Intravenous Injection of Antimonium tartaratum.**—*Jl. Trop. Med. & Hyg.* 1917. Oct. 15. Vol. 20. No. 20. pp. 229–236. With 1 plate & 1 chart.

ii. Susu (B. J.). **Espundia in the Anglo-Egyptian Sudan.**—*Ibid.* July 2. No. 13. p. 146. With 1 plate.

i. A case of espundia, occurring at Sennar on the Blue Nile, successfully treated by intravenous injections of tartar emetic, is fully described, with illustrations. The disease had been in progress for at least four years. Leishmania were found in the lesions. There was

no enlargement of the lymphatic glands. Injections of arseno-benzol had proved unavailing.

Of the three cases of kala azar described, two died and one was cured. Of the two fatal cases, one was very advanced when it came under treatment. The patient died suddenly after the thirteenth injection, while sitting up in bed, using the bed-pan. Treatment had been commenced with 3 cc. of a 1 per cent. solution, followed two days later with 4 cc. and a daily increase of 1 cc. up to 11 cc. He was a male native, aged 20. The other case which died was that of a woman in whom the disease was accompanied by the—in kala azar—very fatal complication of pneumonia. The complication is considered to have been a kala azar pneumonia. Leishmania could not, however, be demonstrated in the lung post-mortem. They had been found, during life, in the spleen. It is noted that the parasites cannot be demonstrated post mortem unless the examination is made immediately after death.

The two fatal cases are published in order to draw the attention of those unaccustomed to the administration of tartar emetic intravenously to the class of case which is unsuitable for treatment.

The author recommends the use of a solution of tartar emetic containing 1 gr. to 40 minims sterile normal saline, treatment commencing with 20 minims. This, while being approximately equal in antimony content to 3 cc. of the 1 per cent. solution often used, is, on account of its small bulk, more convenient to administer.

ii. The description, with illustrations, of a case of naso-oral leishmaniasis. The patient apparently contracted the disease in the Sudan, where one previous case has been recorded by Christopherson [this *Bulletin*, Vol. 5, p. 274].

It is of interest to note that both patients lived for some years in or near the same town (Sennar) [see also Christopherson].

E. J. W.

Scott (L. Bodley). **Frontier Sores and their Treatment by Antimony Injections.**—*Indian Med. Gaz.* 1917. July. Vol. 52. No. 7. pp. 231–239.

Sores due to Leishmania occur on the North-West Frontier of India in all the chief military stations. From his experience of about 250 cases in the cantonment of Dera Ismail Khan the author concludes that transmission is not effected by bugs, these insects being comparatively uncommon in the locality. Moreover British officers and ladies are very frequently affected.

Sixty-three cases were treated successfully by intravenous injections of tartar emetic. The results are however discounted by the fact that time did not permit microscopic examination in more than 27 cases and that in only 4 of these were leishmania found.

E. J. W.

Sinton (John A.). **The Treatment of Cutaneous Leishmaniasis with Intravenous Injections of Tartar Emetic.**—*Indian Med. Gaz.* 1917. July. Vol. 52. No. 7. pp. 239–241.

The record of six cases of Oriental sore, in all of which leishmania

was found, successfully treated by intravenous injections of tartar emetic. The results are summarised as follows :—

Case.	Total tartar emetic injected.	Duration of treatment.	Period required for cure.	Number of injections.
I	25 cgm.	10 days	12 days	5
II	89 „	29 „	51 „	9
III	12 „	8 „	13 „	3
IV	30 „	18 „	21 „	5
V	37 „	37 „	42 „	5
VI	36 „	18 „	31 „	5

A 4 per cent. solution of tartar emetic in normal saline was used, it having been stated by Borja and Amaral [see this *Bulletin*, Vol. 8, p. 15] that less reaction is obtained than with the 1 per cent. solution recommended by Vianna. The dose was $\frac{1}{2}$ cc. repeated every fourth or fifth day and increased by $\frac{1}{2}$ cc. at each injection.

E. J. W.

Laveran (A.). **Boutons d'Orient expérimentaux chez les singes ; multiplication des boutons primaires par auto-inoculations chez un *Cercopithecus mona*.**—*C. R. Acad. Sci.* 1917. Aug. 27. Vol. 165. p. 306.

The further history is given in detail of a monkey—*Cercopithecus mona*—whose successful inoculation with *L. tropica* has been previously recorded [this *Bulletin*, Vol. 10, p. 69]. A feature of special interest is that the first of numerous secondary lesions, in which parasites were found, developed 35 days after the appearance of the primary lesions and at the time of writing, six months after inoculation, the animal still presented unhealed sores. The secondary lesions are undoubtedly due to auto-inoculation by scratching. This observation has a practical application in the human condition. Secondary Oriental sores are frequent in man and are generally ascribed to auto-inoculation but as the lesions nearly always occur in an endemic area their cause cannot be regarded as certain.

In the monkey under observation, the primary ulcerations, contrary to what usually obtains, did not become covered with crusts and, in their secretion numerous leishmania were found.

E. J. W.

Laveran (A.). **Boutons d'Orient chez un Mandrill.**—*Bull. Soc. Path. Exot.* 1917. June. Vol. 10. No. 6. pp. 455–456.

The record of the successful inoculation of a mandrill (*Mormon maimon*), with *L. tropica* from a mouse.

The technique employed was that described in this *Bulletin*, Vol. 8, p. 10.

E. J. W.

WALKER (Ernest Linwood). **Observations on Leishmaniasis and Pseudo-Leishmaniasis of the Amazon Basin.**—*New Orleans Med. & Surg. Jl.* 1917. Sept. Vol. 70. No. 3. pp. 283–292. With 2 figs.

The author's observations have led him to the following conclusions :—

"1. Tegumentary leishmaniasis is wide-spread in the Amazon basin, but is probably less prevalent than clinical observation would indicate.

"2. Cutaneous-mucosal lesions clinically similar to tegumentary leishmaniasis, but in which the specific parasites, *Leishmania*, cannot be found, are very common and are frequently mistaken for that disease. Many of these pseudo-leishmanial lesions are of syphilitic origin.

"3. The mucosal lesions of South American leishmaniasis, which have been generally considered to be a secondary manifestation of a primary cutaneous infection, probably represent a distinct primary infection.

"4. The extensive destruction of sub-mucosal tissues including cartilage, frequently observed in old naso-pharyngeal lesions of South American leishmaniasis, are probably not due to *Leishmania* but to a secondary infection which is frequently syphilitic.

"5. Minute blood-sucking flies known locally as "*piums*," and which include chiefly the Simulidae but also Ceratopogoninae, are the insects which conform best to the epidemiological data as vectors of leishmaniasis in the Amazon basin."

E. J. W.

TORRES (Octavio). **Observação de um caso de leishmaniose destruidora.** [Note of a Case of Destructive Leishmaniasis.]—*Brazil Medico.* 1917. May 5. Vol. 31. No. 18. pp. 151–155. With 2 figs.

The account of a case of muco-cutaneous leishmaniasis resulting in the total destruction of the nose without other lesions. The disease was completely arrested by 40 injections of tartar emetic given at bi-weekly intervals over a period of about six months.

The patient was a Brazilian lady, 56 years of age, who about the year 1904 commenced to suffer from a swelling in the right malar region, which was followed by ulceration inside the right nostril. A diagnosis of lupus was made by the practitioners consulted, and a variety of treatments appropriate to the diagnosis was entered upon without any success. The diagnosis of syphilis was also considered and put on one side, in the absence of any other manifestations of that disease. In spite of the best advice, the destruction of the nose proceeded until the condition shown in the two illustrations was reached, the whole of the bones of the nose and the septum being destroyed. The author of the present paper, having cognizance of the case, finally persuaded the patient to put herself under his care. Scrapings from the ulcerated surface having shown the presence of a few Leishman bodies, a course of endovenous tartar emetic injections was entered upon, in the month of November, 1915, and continued until the beginning of the following month of May, by which time the ulceration had been totally arrested, and cicatrization secured. The total quantity of tartar emetic used for the 40 injections amounted to 2·34 grammes, the individual doses ranging from one-half to one decigramme. In addition, the ulcerated surface was painted twice daily with a solution of 1 per 1,000 of tartar emetic in normal saline, containing a few drops of adrenalin.

J. B. N.

TORRES (Octavio). **Distribuição geographica da leishmaniose na Bahia.** [The Geographical Distribution of Leishmaniasis in the Province of Bahia (Brazil).]—*Ann. Paulist. Med. e Cirurg.* 1917. Feb. Vol. 8. Year 5. No. 2. pp. 39–43. With 1 map.

The most important part of this paper is the map on which are clearly shown the localities in which the principal incidence of cutaneous leishmaniasis in Brazil has been hitherto observed. The distribution very closely follows the railways, and suggests accordingly that the disease has been imported by immigrants at various dates, and is not indigenous to the country.*

J. B. N.

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* Such a distribution may mean nothing more than that enquiry, or medical practice, is less advanced in places more remote.—ED.

Book Review.

Sellards (Andrew Watson). **The Principles of Acidosis and Clinical Methods for its Study.**—vi + 117 pp. With 1 fig. 1917. Cambridge, Mass., U.S.A.: Harvard University Press. [Price $1·00.]

In other publications, referred to in the bibliography, Dr. Sellards has dealt with certain special phases of the "Acidosis" problem. The subject is as important as its effects are grave, since the body possesses no satisfactory defence against acidosis. The alkalies required for the re-establishment of equilibrium must be taken from the blood and the loss thus suffered starts another train of trouble whereby tissue respiration is seriously interfered with. In normal metabolism acid radicals are formed but they do not appear in excretions. In health they are either excreted with the usual bases or they are neutralized in the body. Thus the balance between alkalies and acids is maintained at an almost constant figure.

After a short "Introduction" containing a sketch of our knowledge of acidosis and the history of discoveries and researches to which such knowledge is due, the author considers the factors of "equilibrium between acids and bases" in health and in those pathological states covered by the term "acidosis." The methods of diagnosing acidosis are divided into: (1) Clinical signs, mainly those of dyspnoea and a "picture" of "a typical air hunger" in advanced stages of the malady, and (2) Laboratory Methods. These include: Examination of the blood for lowering of alkalinity and lowering of carbon dioxide content, with estimation of any lowering of CO_2 tension in the alveolar air. Since the abnormal acids may be found in the urine careful search must be made for excess of acid and for abnormal acids. One of the signs of acidosis is an increased output of ammonia. The acids usually produced belong to a series beginning with β-oxybutyric acid and culminating in diacetic acid and acetone. Certain tests are given by various authors. The best known is the perchloride of iron test. If diacetic acid is present in the urine (which should be defecated before the test is applied) addition of perchloride of iron produces a claret colour. A somewhat similar colour may result from the presence of carbolic acid or salicylates. This latter class of reaction is not affected by boiling the urine, whereas the "diacetic colour" will not appear when perchloride of iron is added to urine which has been well boiled. A still more sensitive test for diacetic acid is the following: Nitro-prusside of sodium and strong ammonia are carefully poured into a test-tube so that they do not mix. Urine is then added and if the abnormal acid be present a magenta ring is formed at the line of contact of the two test fluids.

Acidosis occurs in diabetes, cholera, "Food intoxication" of children, probably in rickets, in infection with *B. perfringens* and frequently after inhalation of chloroform. If there is still much to learn concerning acidosis and allied conditions this small volume shows that as the result of much investigation valuable knowledge has been gained as to possible treatment of intoxication by abnormal acids. Rogers and Shorten (*Indian Journal of Medical Research*, 1915) reported a series of cholera cases treated with intravenous injections of alkalies. The death-rate among 225 cases of uraemia was 2·7 per cent., "as compared with 11 per cent. in 1914, 8·5 per cent. in 1913 and 14 per cent. in 1912," when only saline infusions were used. Dr. Sellards has given much time and attention to the treatment of the uraemia of cholera. He writes: "The effect of massive doses of bicarbonate was tested by myself in a small epidemic of cholera occurring in Manila . . . satisfactory evidence was obtained that fatal uraemia could be prevented provided injections of alkali were commenced either during the stage of collapse, or even after an outspoken nephritis had developed, but before a typical uraemia had appeared. In a subsequent epidemic comprising a study of only 44 cases, a similar result was

obtained." The results of such treatment are shown in the following "table":—

Treatment.	No. of Cases.	Deaths in Uraemia.	Total No. of Deaths.	Total No. of Recoveries.
Neutral Solution [NaCl].	78	12	49	29
Bicarbonate (or Acetate).	77	1	32	45

The bicarbonate of sodium is given with the saline solution and continued until the urine is alkaline to litmus. "It is not permissible to use massive injections of alkali intravenously after the urine has become alkaline." "In early cases it is entirely justifiable to administer 5 grammes of sodium bicarbonate by the mouth repeating this dose every two or three hours till the urine becomes alkaline."

The question of treatment is very fully discussed by the author and the chapter on "Therapy" is one of the best. It is given prominence here because for the general practitioner the treatment of acidosis is of most importance.

A useful "Appendix" contains "technique of methods" recently developed and of clinical importance in connection with the chapter on "Diagnosis." This is followed by a very complete bibliography. The book is well written and singularly free from misprints; its value would, in future editions, be increased by the addition of an "Index."

J. H. Tull Walsh.